Joint Informational Hearing

Senate Committee on Agriculture
Senator Cathleen Galgiani, Chair
and
Assembly Committee on Agriculture
Assembly Member Henry T. Perea, Chair

Impacts of the Drought on Agriculture

Sacramento, California
December 3, 2015

SENATOR CATHLEEN GALGIANI: I'll go ahead and call the hearing to order, our special hearing titled Impacts of the Drought on Agriculture. I don't have to tell you, you already know, that California is entering its fifth year of drought, and it has caused so much damage to our local farms and our ranches but also to the communities; and it has had other impacts that we are here to discuss today. In particular, farming has always had its challenges because it is so reliant on the weather and availability of water; but climate change, the low snowpack in the Sierras, and limited water resources are all challenges that must be overcome.

This hearing today will provide an overview of the drought and discuss adaptive strategies to mitigate the impact of the drought on ag and our ag communities, and we have invited expert witnesses who will discuss current state programs, multiplier effects of the drought on schools and farmworkers, and on-farm innovative strategies to improve water efficiency and use.

Drought is certainly a critical issue for California and for much of the Pacific Northwest, so today, I look forward to a robust discussion of all of these issues and so that we can come up with possibly some ideas of some things that can be done to mitigate the impacts. So I appreciate you being here today. I appreciate your participation and your preparation. And there will be an

opportunity during the public comment period for anybody that would like to make a presentation, but we would please ask that you sign in with the sergeants at the back of the room.

With that, we will go ahead and begin. And with me today, we have Assembly Member Henry Perea, who is the chair of the agriculture committee in the Assembly. Thank you for participating in this joint hearing with us, and would you like to say a few words?

ASSEMBLY MEMBER HENRY T. PEREA: No, I am good. We will get right into it.

SENATOR GALGIANI: Okay.

ASSEMBLY MEMBER PEREA: Thank you.

SENATOR GALGIANI: Okay, very good. Okay, I would like to invite our first panel to come forward. Our panel members include Jennifer Lester Moffitt, Deputy Secretary at the California Department of Food and Ag; Dr. Jay Lund, Director for the Center for Watershed Sciences at UC Davis. Thank you.

SENATOR GALGIANI: Thank you.

MS. JENNIFER LESTER MOFFITT: Good morning and thank you, Mr. Perea and Mrs. Galgiani--sorry--for inviting me here today. My name is Jennie Lester Moffitt, and I am Deputy Secretary for Policy at California Department of Food and Agriculture. Prior to my tenure at CDFA, I served as the vice chair for the Central Valley Regional Water Quality Control Board, and I also was managing director at my family's walnut farm in Winters. So I am very pleased to be here.

To get to the crux of this discussion, drought is deeply impacting California's farmers and ranchers. And it very well, may well be--regardless of this winter's expected high rainfall and snowpack--that the drought is becoming, and has already become, the new normal here in California; and we need to prepare, better prepare, ourselves and learn to adapt. There hasn't been an issue that has left this large of a ripple for farmers and ranchers in California as the drought. It

has not only effects on employment and land management but also science, technology, production, and ultimately the environment. It's important to note that these impacts have most strongly been felt by our local and regional communities, communities that are some already most hard hit by other aspects. And we'll hear from those communities on the panel next, and I look forward to hearing from, hearing their stories. And I'm sure they can tell a much better story than I can.

Surface water and groundwater shortages have left producers to shift their crop contracts, to change their plantings, and to fallow land. Local communities in the Sacramento and San Joaquin valleys have been especially hard hit with high land fallowing and job losses. Dr. Lund, here with me today, with UC Davis will present on the university finding. But in essence, drought losses this year have projected to result in about 30% increase in unemployment at about over 10,000 job losses over last year and then also 20% more farmland idle than last year at 540,000 acres. This has resulted in a direct cost to agriculture at $1.84 billion just in 2015.

Particularly with respect to dead and dying trees, in a letter to USDA to Secretary Tom Vilsack, Governor Brown noted that the current period is the worst epidemic in tree mortality in modern California history. There's estimates that nearly 30 million trees across the state have been lost as a result of drought and following wildfires. Trees are especially vulnerable to devastation during the drought since the lack of water can make them susceptible to insects and diseases; and in effect, some of our most economically valuable crops, like fruit and nut trees, are at risk.

Livestock producers alike have also experienced losses due to feed shortage and irrigated pasturelands. And in spite of all of this, some counties have resulted in record crop yields. In total, last year California farm production topped $54 billion, leading the nation. We also lead the nation in the production of almost 80 commodities that are the sole producer of 14 commodities in California, including walnuts--which my family grows--and other products such as almonds and

raisins. California's agricultural exports totaled $21 billion in 2013, representing 15% of the nation's total. What those figures show is that farmers and ranchers are adapting. So they are adapting to remain sustainable while producing with access to fewer natural resources and responding to greater demand.

Looking ahead, California will need to take its position as a world food leader, to maintain it, and to find a way to build on it while utilizing fewer natural resources. One way in which we can achieve this is through water conservation. According to Department of Water Resources, over the last roughly 50 years, the total applied water to crops was reduced by 8% and efficiency has increased by 96.6%. That is a reduction of water to crops from 31.2 million acre-feet to 29.6 million acre-feet in the past approximately 50 years. California farmers are looking for ways in which they can remain competitive, with new systems and management systems. And while our success to date has been laudable, there is still room to do more. I look forward to hearing today from Dr. Zoldoske with Fresno State as they are working to advance irrigation technology.

Farmers lost nearly 35% of surface water supply this year, and much of that has been made up with groundwater pumping. And while that provides a short-term solution, we are all aware that there is price to pay, as is demonstrated by the recent NASA report on subsidence. It shows that land in the San Joaquin Valley is sinking faster than ever before, nearly two inches per month in some places. As groundwater levels are reaching record lows, up to 100 feet lower than previous records, one report showed that land near, in Kings County sank 13 inches in just eight months. This makes it clear that, while the Sustainable Groundwater Management Act signed last year by the governor sets to control some groundwater, there is still much more work to be done. The level of groundwater pumping is clearly not sustainable. And as more private drinking water wells dry up, there will be additional pressure on land use decisions, the well-permitting process, and

ultimately potential limits on groundwater pumping even before SGMA, the Sustainable Groundwater Management Act, process unfolds.

There is an active discussion about making sure the SGMA performs effectively for the locals, and we at CDFA are encouraged by the participation. Yet, as we gear up for an expected wet winter, there are opportunities. I know Dr. Mountjoy today will highlight some of those in his presentation.

As farmers and ranchers in California employ new practices to promote sustainability and conservationism, CDFA has also begun implementing programs. We are working together with our ongoing preparations for drought, and we are pleased to serve on the governor's Drought Task Force. The Drought Task Force is working to provide protection for California's communities, infrastructure, and resources against immediate drought impacts. Even now as the drought persists, the Drought Task Force, led by Office of Emergency Services, prepares for possible winter storm impacts from El Niño including floods and in addition to continued dry conditions for next year. In addition to assistance programs, outreach, and coordination with the federal government and local jurisdictions, the Drought Task Force has also conducted regional communities, regional meetings in many communities around the state.

CDFA also serves on governor's Climate Action Team to assess the environmental issues driven by climate-related events like our drought, which include reduced water supplies, increased plant heat stress, and increase in invasive species.

Beyond our work on interagency efforts, CDFA has also developed our State Water Efficiency and Enhancement Program. This program provides financial incentives to growers to put in place water distribution and irrigation systems that both reduce greenhouse gases and save water. These systems include things like soil and moisture monitoring, micro-irrigation or drip systems,

and switching to the use of low-pressure irrigation systems to reduce on-farm water use and energy. The State Water Efficiency and Enhancement Program, otherwise known as SWEEP, was originally allocated 10 million as part of emergency drought funding in March of 2014. For that initial round of applications, the program received a total of 451 applications totaling $33.3 million in requested funds. We ultimately funded 133 projects. Through the Budget Act of 2015, CDFA received an additional $10 million and awarded to date 100 projects totaling $14.6 million with matching funds provided.

I would like to point out these incentives are important in moving growers in the right direction to water efficiency and savings. The number of applications clearly indicates how popular this program is and how interested growers are in employing these systems. The program has been habitually oversubscribed by 300%. More recently, because of SWEEP's demonstrated success, later this year in the legislative session CDFA received an additional allocation of $40 million. During this month, CDFA will hold four workshops and one webinar throughout the state on the next round of SWEEP competitive grants. These dates and times are noted in your handout, and we would love to have you or your staff participate in them. We look forward to continuing to provide financial assistance to implement these systems that save water on California's agricultural operations.

Beyond SWEEP, CDFA is also interested in the role that soil health plays in drought adaptation and resiliency. As the nation's leading agricultural production state in terms of both value and crop diversity, it is undeniable that our soils are the fundamental medium for crop production. In recognition of the United Nations' and the legislature's proclamation of the 2015 International Year of the Soils, the 2015-2016 proposed budget, and the governor's recognized importance of soil health through the development of the Healthy Soils Initiative, they have noted

that long-term climate change resiliency, healthy soils are responsible for numerous benefits including increased water-holding capacity, increased crop yields, and decreased sediment and erosion, just to name a few.

In your packet, there is also a handout with more information on the Healthy Soils Initiative. While the CDFA's Healthy Soils Initiative has not yet been funded, the draft investment plan highlights the importance of this initiative that CDFA has identified and several actions that are consistent with this initiative that will ultimately increase soil health and have added benefits for farmers and ranchers and opportunities to adapt to drought conditions. We will continue to engage in drought efforts and hope our programs will continue to be effective in helping the agricultural community thrive. Thank you for this opportunity.

SENATOR GALGIANI: Thank you very much.

MS. LESTER MOFFITT: Thank you.

SENATOR GALGIANI: And next we have Jay Lund, Director of the Center for Watershed Sciences at UC Davis.

DR. JAY LUND: Thank you very much for having me. It's a pleasure to be here. I'm just going to… You all have a set of PowerPoint slides in front of you, I think, that have most of the charts and things. I'm going to review our report that we came out with in August of this year on "Economic Analysis of 2015 Drought for California Agriculture." Hopefully, you all have the notes in front of you. This work was done--it was funded by CDFA, similar to a report funded by CDFA and the UC system the year before. It was done by a collection of agricultural economists, engineers from different organizations in the UC system.

The second slide, second page, is Sacramento Valley precipitation during 2015 and a few other years. Everybody has their own water year, own kind of annual cycle in the water field. We

have a water year that starts October 1st and runs through the end of September. And you can see here that the cumulative precipitation in the northern part of the Sacramento Valley during each various types of years, including last year and the year before, and then the driest years of record. You'll notice that in the driest years there may be three or four steps as each storm contributes water to the system, and in the very wet years, we have maybe another half dozen storms. So the big difference between a wet year and a dry year in California is only about a handful of storms and the size of those individual storms, so I think that's something to just sober us up a little bit about how easy it is to have a dry year here.

2014 was the eighth driest year on record. In some ways, this drought has been record setting; in other ways, it has been fairly typical. In those… And 2014 was also the fourth driest year in terms of runoff from the Sacramento Valley. So how do you have the eighth driest year of precipitation and the fourth driest year of runoff? Well, it has been a very warm drought, and that explains how we've had so little snowpack. So we had a lot more evaporation off of the watersheds, leaving less water coming out the bottom end of the watershed available for farmers even though we had only the eighth driest year in terms of precipitation.

Go to the next slide. A little bit on the methods that we used and their analysis for 2014 and 2015. 2015 was a bit more expensive [expansive, *sic*]. We collected data from 72 different irrigation districts, irrigation suppliers, water suppliers throughout the Central Valley and around the state. We estimated their maximum pumping capacities and then we modeled… We had a very large computer model called SWAP, Statewide Agricultural Production model, that looked at water, economic value of agriculture produced, and different crops produced all over the state based on water supplies. We work on the groundwater with a very nice model that the Department of Water Resources has been developing, C2VSim, and they cooperated quite a lot in helping us do this

work. And then we estimated the employment and economic, macroeconomic, impacts with a model called IMPLAN. So we're basically using these computer models to assimilate the data that's available and interpolate and extrapolate from that in a reasonable way.

So some of the results from that--go to the next page, page four--you can see the shortage of surface water. Basically, we lost about 9 million acre-foot of what would normally be surface water deliveries to agriculture this last year. Of that, it was almost all in the Central Valley, particularly as you move further south into the Tulare Basin. The coastal systems were much less affected. The groundwater pumping increased by about 6 million acre-feet, so about 70% more groundwater pumping. If you look at the impacts of the drought, the biggest, most effective response statewide was pump more groundwater. And that's certainly what they did out of Winters, leaving about 2.7 million acre-foot of shortage. That's equivalent to almost three full Folsom reservoirs if you want to, if you want to get that image in your head. That's about 10--oh, more than 10--times the storage of Folsom now, actually. Folsom's pretty empty right now.

The next page, slide, page five, is really the main event here. The top line is the shortage impact of the drought to agriculture. We lost about 8.7 million acre-foot. It's about one-third of the water supply. Pumping in groundwater increased tremendously to make up for about 70% of that loss. So about 70% of the response to drought is groundwater pumping, and in a fourth year of a drought, that's what we will always see in California. Groundwater is the big source of storage, and always will be, when it comes to long droughts. That left a fair shortage remaining, 2.7 million acre-foot. Ended up fallowing about a half million acres or about 6% of the agricultural land. So even there you can see we lose one-third of the water supply, but we fallowed only 10% of the land, or 6% of the land--excuse me--because of that groundwater pumping, mostly. We had economic losses, direct losses, to crop revenue of about $900 million, about $350 million to dairy and

livestock. Notice the percentages there. It's on the order of 3%. So how is that? Farmers are pretty smart. If they only have a little bit of water, they're going to put it towards their most valuable crops. They're going to fallow the least valuable crops and the least productive soils. So between some fairly smart water managers at the project level, water supply delivery level, and at the farm level, we really reduced this 33% loss of water down to a 3% loss in revenues, direct revenues. However, we had to pay for all that groundwater pumping. That's almost $600 million of additional cost for, you know… That's quite a lot.

UNIDENTIFIED SPEAKER: It's not cheap.

DR. LUND: It's not cheap, but it, but it's better than going out of business.

UNIDENTIFIED SPEAKER: Right.

DR. LUND: So we have a net loss of, net revenue of about 4%, and we had a 10,000 direct jobs lost, around the order of 5% of agricultural employment.

So I have sort of a mixed view of this drought. Given how bad it is, we're doing pretty well. So I guess I will put that spin on it.

It also points out areas where we need to really pay attention. But it's amazing, I don't think any other agricultural system in the country would have done this well with this much of a loss of water. I think we should be pretty proud of that in a sense.

SENATOR GALGIANI: I think so. I think the concern, of course, is that we can't sustain this year over year because…

DR. LUND: That's right, the groundwater…

SENATOR GALGIANI: … we cannot count on groundwater.

DR. LUND: … is very important, and that's why I think the groundwater legislation last year…

SENATOR GALGIANI: Uh-huh.

DR. LUND: …was tremendously important.

Let me go through the impacts just a little bit more, and then I'll have a slide at the end about how much groundwater we have left.

So you can see on the next slide, slide six, where different crops were fallowed, acres were reduced on different crops in different regions. You can see it's mostly in Central Valley and particularly in the Tulare Basin and that it's biased to fallow the lower-value crops.

If you go to the next slide, page seven, you'll see the revenue losses from those crops, and you'll see the order sort of changes. You might lose just a few acres of orchards and vines, but they have a disproportionate economic impact, illustrating why farmers are loathe to fallow those.

The employment, agricultural employment--in 2014 we did a long analysis of that because when we looked at the employment statistics we found that the agricultural employment in 2014 actually increased despite the drought. So people were… some folks were saying, well, you had an employment increase so the drought had no impact. Well, that's obviously wrong. We still lost some of the 10,000 jobs in 2014 due to the drought, but because of the shift in the structure of agriculture from annual crops to more profitable, higher-employment permanent crops, we had a growth in the overall employment. Still, we certainly lost a lot of jobs because we fallowed 400,000 acres last year and 500,000 or so acres this year.

So clearly, the drought isn't the only important thing that's happening with California agriculture, and I think this points to some of the challenges we're going to have for water management and drought management in the future. Today, about one-third of California's irrigated agriculture is in permanent crops, orchards and vines. If you fallow that during a drought, you have

a tremendous loss of capital and, again, that comes back to the importance of sustaining that groundwater to keep those high-job, high-revenue crops going in the rural areas during droughts.

The next slide, slide nine, sort of illustrates this. If you… We plotted here the cumulative acres in California, irrigated acres in California, by the number of jobs and the total revenue, and you'll see that about half of the crops are responsible for 80 to 90% of the revenues and employment, which from a drought management perspective gives us a lot of robustness. You know, it hurts when we have to fallow these crops. It's certainly… They're real people that really lose their jobs and the real communities are affected. But we can safeguard the most important things, at least so far, in these droughts and I think for the next few years, even if it remains as bad as it has been the last two years, fortunately.

I always try to add onto this--in the urban sector, it's a very similar kind of a picture, where we use about half of the water in the urban sector for landscape irrigation, which is a fairly low-value use in the urban sector. We don't… We don't close the Silicon Valley chip factories as the first drought response.

We've sort of deepened our analysis in terms of looking at satellite images of the fallowing. You can see some estimates of idle, crop land idling between 2011, which was a wet year, and 2014. You can see a special redness down in the Tulare and San Joaquin basins.

So overall conclusions, the economy so far has been fairly robust with a severe drought. I mean, it certainly hurt, I don't want to take away from that, but it could have been a lot worse. We're not… We should not be at the point of panic, for the most part. There certainly will be individual farms and some individual communities where they need to be very, very concerned; but as an overall sector, it has responded in a very healthy way.

Groundwater has been central in this. Markets, fallowing has helped and then just absolutely amazing local water district, local farmer response to the drought in terms of doing smart things and coordinating with each other and buying and selling water to respond to this. We still have some major issues for the drought and continuing on. The drought does a really nice job of stress testing our water systems, and I think it has highlighted the problems we have in the Delta groundwater, where we've responded to nicely with the 2014 SGMA ecosystems and our ability to account for water and to coordinate things. So droughts and floods remind us to change and to help us, remind us to prepare for the next one.

And then this figure here illustrates that we have really quite a lot of groundwater in storage in the Central Valley in particular. We projected out if this drought were to continue for another two years, and if it does continue for the next two years, that the shallower wells start to go dry at an increasing rate, the pumping costs increase because you have to pump from deeper levels. And so you have a little bit more shortages, and it costs you a little bit more for groundwater pumping. It's a slowly increasing net cost to employment and to operations and losses, but it's not you fall off the edge of a cliff as a sector. Now, if you're an individual well owner, when your well goes dry, you individually fall off the edge of a cliff unless you can buy water from a neighbor.

That's my remarks, thank you.

SENATOR GALGIANI: Thank you. Given the situation… I mean, I represent a district where we've been hit by floods in the past, particularly in 1997, very bad floods up here in the Natomas area and then down in the South San Joaquin Valley. So I'm wondering if CDFA has been included in conversations with DWR and others, so that if we do have the El Niño that we're hoping for this year, we would take the opportunity to capture some of that flood water and use that for

groundwater recharge on some of our existing farmland. So has CDFA been included in those conversations?

MS. LESTER MOFFITT: Yes. Yes, we've been very actively engaged in those conversations with DWR and with the State Water Resources Control Board. And in the governor's executive order, he released two drought executive orders last month, and one of them, the second one, not only extended water conservation but also encouraged agencies to work together to streamline permitting. And as a result of that executive order, we have been very engaged and very involved, and we have been before that anyway.

I think there's a lot of opportunity not only for groundwater recharge but, as you talked about, flood relief for downstream communities; and I think that's a huge, huge benefit. You know, we all… In our world, we talk a lot about co-benefits, and I don't think this is a co-benefit at all. I think they go hand in hand, and that's how, we've been, you know, in California for many, many years, is the opportunities for farmland to work with our natural systems is, I think you know, a huge benefit. And I'm sure Tim Johnson will be speaking later today, with the Rice Commission; I'm sure he'll be talking a lot about that as well.

ASSEMBLY MEMBER PEREA: Just a quick question to Deputy Secretary Moffitt. So first, thank you both for your presentations. And Deputy Secretary, I really appreciate a lot of the statistics that you provided. I was trying to write down as quickly as I could as you were talking, but I want to make sure just I got my facts straight. So you said that 20% more farmland has been fallowed this year as opposed to last year; is that…

DR. LUND: Due to the drought.

MS. LESTER MOFFITT: Due to the drought, yes.

ASSEMBLY MEMBER PEREA: Which resulted in 1.8 billion in farm loss; is that…

MS. LESTER MOFFITT: In direct farm…

ASSEMBLY MEMBER PEREA: Direct farm loss.

MS. LESTER MOFFITT: And that includes--and you can correct me if I'm wrong…

DR. LUND: It came from your reports.

MS. LESTER MOFFITT: Yeah, it came from… It came from our report, but that also includes…

ASSEMBLY MEMBER PEREA: Okay.

MS. LESTER MOFFITT: …additional costs of pumping, as well.

DR. LUND: Right. That's right.

ASSEMBLY MEMBER PEREA: Got it. Okay. And then I think the most stunning is the 35% loss of surface water due to…

DR. LUND: Well, total water actually. It's about…

ASSEMBLY MEMBER PEREA: Oh.

DR. LUND: …33% loss of total water supply.

ASSEMBLY MEMBER PEREA: I mean, that's huge. I mean, I think that was part of the--not that I want to rehash old debates… but it was part of the debate, you know, over the groundwater legislation was, well, if you don't have access to your surface water, where are you going to get it? Otherwise, places like the Central Valley and where I represent, specifically southern Fresno County, could have looked like a modern-day Dust Bowl. I mean, there are communities out there that could literally just dried up there. And some are that small where, you know, they really are a town of four large farms…

DR. LUND: Uh-huh.

ASSEMBLY MEMBER PEREA: … and that's the town, and if one of those towns goes away, then the school is relocating and then the whole thing changes.

So I did have one question in particular, though, in terms of one of the facts you brought up. You had mentioned that farmers had become more efficient with water. I'm assuming that means drip irrigation or other technologies that are much more precise in how farmers are using water. Has CDFA or anybody else measured the impact to groundwater recharge with these new technologies? I hear a lot of anecdotal comments that, you know, farmers used to flood irrigate in many ways, and a lot of that water would then recharge the groundwater; and now that we're more precise, one of the side effects of that is we're not getting that benefit. Can either one of you talk to that?

DR. LUND: I'm delighted that you raised that point because there's a lot of folklore in the past about how important the alleged savings that you get by going to drip irrigation in the inland areas; and that savings is really false savings because that water is already being saved as recharged groundwater in many cases. So we do see some small reductions in sort of evaporative losses that are unproductive when you go to precision irrigation, but it's relatively small. I think there's a reasonable concern that as we move to drip irrigation for several other reasons, for improving the quality of crops and improving irrigation uniformity and crop yield, one of the downsides is that we're reducing the amount of recharge to groundwater that we need to sustain these permanent crops through drought years. So people are starting to look at how can we supplement by artificial recharge or the way we manage the irrigation districts additional recharge, to take that water that used to be recharged through the fields and recharge it through the distribution system or artificial recharge so that we maintain that groundwater basin.

ASSEMBLY MEMBER PEREA: Has an analysis been done on… So I'm assuming that CDFA or other state programs are providing incentives to farmers to switch to drip irrigation; and some farmers are probably just doing it on their own, maybe taking subsidies, maybe not. Has a cost analysis been done in terms of what we're spending, what they're spending, and the savings that we're receiving from that?

MS. LESTER MOFFITT: I'm sure there has been a cost analysis.

ASSEMBLY MEMBER PEREA: Okay, you [overlapping]

MS. LESTER MOFFITT: I'm not aware of it. But one thing I want to make a point of is in our incentive program, our State Water Efficiency and Enhancement Program, we do not discourage taking out previous flood systems, and we definitely want to encourage, and we talk with growers about the opportunities that in dry years we employ the more efficient water irrigation systems…

ASSEMBLY MEMBER PEREA: Okay.

MS. LESTER MOFFITT: …but in wet years where we have the adequate water supply, we can refer back to old systems. So it's, you know, the concept of conjunctive use and being mindful…

ASSEMBLY MEMBER PEREA: Right.

MS. LESTER MOFFITT: …that…

DR. LUND: Right.

MS. LESTER MOFFITT: …you know, we're--and growers need this as well to not only flush out salts and…

ASSEMBLY MEMBER PEREA: Right.

MS. LESTER MOFFITT: …you know, other things in the soil as well, but to be mindful that, you know, as we are employing these efficient irrigation systems, you know, we're using those in the dry years and then in the wet years we're going back to the systems that have been employed for many years.

ASSEMBLY MEMBER PEREA: And so is that sort of the… Is that the standard practice right now? I mean…

MS. LESTER MOFFITT: It depends on…

ASSEMBLY MEMBER PEREA: Okay.

MS. LESTER MOFFITT: …each individual farming system. I think it's something that we certainly don't discourage in our grant process.

ASSEMBLY MEMBER PEREA: We don't necessarily advocate for it; we just tell you you can't, you know, you shouldn't. Well, how does the state interact with farmers in that regard? Because, I mean, what you're saying to me makes sense, but how do we--how do we manage all of that? How are we communicating?

DR. LUND: I think one difficulty is California is a very large state and it's very diverse in its agriculture; it's very diverse in its hydrology…

ASSEMBLY MEMBER PEREA: Yeah.

DR. LUND: …and the local water districts and the local farmers, I think, are the most mindful…

ASSEMBLY MEMBER PEREA: Right.

DR. LUND: …of what they really need to do and…

ASSEMBLY MEMBER PEREA: Right.

DR. LUND: …that has really shown up now in pretty effective responses locally to… And, again, to the point of can we collect any wetness that comes this year. This is on everybody's mind. I think every farmer, every urban user, every water manager at the local, state, federal level, they're all thinking the same thing. So…

ASSEMBLY MEMBER PEREA: Sure.

DR. LUND: …we'll catch as much as we can, I'm sure.

ASSEMBLY MEMBER PEREA: Thank you.

SENATOR GALGIANI: This question is to both of you. So when we were having the policy discussion on the groundwater management legislation last year, one of the things that I raised was is there an ability to count groundwater recharge as a beneficial use. And at the time, the answer was: no, we have to get the policy right on the groundwater management first--and that's not settled yet--before we address… You know, how do you quantify what's beneficial use and how… Who gets credit and who gets access to that first and who has it last and so on and so forth? What are your thoughts on that? Do you think we're at any point closer to being able to start looking at counting groundwater, or groundwater recharge, as beneficial use?

DR. LUND: My understanding is that the concern at the State Water Resources Control Board level, at the legal level, is trying to maintain the integrity of the surface water rights system so that people are not sort of laundering water through groundwater so that they can avoid changes in water rights permits. That's my understanding of it. I do think as a systems analyst for the system that we do have to encourage people to bank groundwater; and to some degree, banking groundwater when you're not sure exactly what purpose it will be put towards in some future drought is a good thing. We're not sure that… We're not sure who and where and what is going to need that water exactly in the coming drought; but we know someone is going to use it, and it's

going to be… We'll be really glad to have it there. So I think we do need to move fairly aggressively in that direction.

SENATOR GALGIANI: Any other questions of either panelist?

DR. RICHARD PAN: Well, again, I'd like to thank both of you for your presentations. Just one question, and I know you touched on it briefly. You know, we've talked about the Healthy Soils Initiative; and, you know, often when we talk about drought, we're talking about water supply; but it's not just water--you know, water washes away salts and so forth. What's the impact of the drought on soil conditions? Particularly, I don't know if you're heard about… I guess we're moving toward not only groundwater recharge; but as for getting more efficient, that's a good thing with the water, but we're also then impacting the quality of the soil and its ability to grow crops. And how is, I guess, CDFA looking at that, and how are we are trying to address that?

MS. LESTER MOFFITT: Well, so the direct question: what is the impact on drought and soil conditions? That's a very good question. I don't have an answer for that. I'd say certainly land fallowing does not improve soil conditions in the state; but beyond that, I don't have much more of an answer. You know, for healthy soils, it's really looking at management practices, on-farm management practices to increase soil organic matter and… So by doing that in that way, by increasing soil organic matter, you can actually hold more water in the soil. But, of course, first you have to have water available to hold into the soil.

DR. PAN: Right. Okay, that… You know, obviously the soil itself… Obviously, water's a very important component to that; but if the soil has too much salt or other things and you can't wash it out, it's--you're not going to be able to grow things very well either. And so I think it would be good to look at that.

DR. LUND: I think there will be a concern in some areas--in the San Joaquin Valley in particular--that there might have been enough water to grow some of the crops but not enough water that you would add a little bit more water to flush some of the salts out. I imagine that some of the farmers have been making as tradeoffs, thinking about what's the impact on next year's, future year productions if I can't flush…

DR. PAN: Right.

DR. LUND: …the salts out this year.

DR. PAN: So, obviously, that's going to have an impact on our agricultural productivity over time, and it's sort of a cumulative effect. And then I guess the other thing I know that we touched on, groundwater. And I think in terms of looking at, you know, our water use, often we talk about, okay, you know, you take the water from the river or from wherever and then we--certainly in Northern California--the water we don't use, hopefully--some of it will evaporate, which then isn't very useable; some of it will, hopefully, become groundwater recharge; some of it actually flows downriver and gets reused again.

DR. LUND: Uh-huh.

DR. PAN: And so I hope that when we're looking at this, when we try to figure out how to count how we're using the water, that we take into account the fact that at certain places that you're not losing the water. You know, we need to be very accurate how we count how we use the water and not simply say, well, if you used it--I mean, depending where you are--and I think it does speak to the different hydrologies and different things--but I certainly hope--and I know that there's other agencies involved as well--but when we look at that, we take account of that aspect of things and different areas, if the water is going to be able to be reused because it flows back into the river or

wherever else or groundwater--that that's something we should take account of because that would be a more accurate assessment of, actually, our water supply.

DR. LUND: I'm glad that you raised this because this, I think, is one of the biggest challenges and biggest weaknesses that has come up--been highlighted by this drought--is the really fairly poor level of accounting that we have as a state. We have many different state agencies, each of which maintains separate and somewhat distinct accounting systems, and some agencies even have several accounting systems within the agency. I think in the long term for droughts and for SGMA implementation and water rights administration as well as policy and environmental management, we need to have a far more authoritative and centralized statewide accounting system that operates across the agencies. And you might tailor a little differently, you know, [inaudible] off of for different purposes. But we're really hindering our ability to manage and have coherent policy discussions because we lack the kind of accounting system that you point out.

DR. PAN: Well, certainly, I think more accurate information will hopefully help drive better decision making. [cross-talk]. Thank you.

SENATOR GALGIANI: Assembly Member Mathis.

ASSEMBLY MEMBER DEVON J. MATHIS: As you were discussing the numbers and the yields and, you know, we're going from surface water to pumping groundwater, and you mentioned, you know, there's no need for concern, it's not like we're going off a cliff; but in reality you can only drill so deep with groundwater where you get to a point where the water is not only not potable for humans, but it's not good for the plants. I mean, I know farmers that have quite literally de-sal systems on their pumps because the water that they're pulling up is so bad it will destroy their crops. So when we're looking at the solutions for this and in your analysis and the data that we're collecting, what are we looking at as what is the endpoint because different basins

go different depths. But there's a point where we just can't go that deep and the water's not there. And at that point, what do we do if we're not considering groundwater recharge as a vital use, if we're not increasing our storage capacity, and we're not looking at other sources such as de-sal to bring water in.

DR. LUND: Again, California is a very diverse place. And you're right, there are places where farmers are coming across these problems; and as the drought would wear on, we will see those problems increasing. I'm saying as a cautionary note that statewide -- as an overall statewide sector, it's not falling off of a cliff, but locally it might well, you know. And certainly, individually there will be instances of it, and we already have had these instances.

ASSEMBLY MEMBER MATHIS: But locally when you look at the subsidence issue--you look at, you know, Kings County, you look at the San Joaquin Valley Basin, that is the heart of our agriculture center in the state of California.

DR. LUND: Right.

ASSEMBLY MEMBER MATHIS: That is the spot that is being hit the most; and, you know, as a state, we'll be able to have other areas in the state that are ag use; but the climate within the San Joaquin Valley is the only climate in the world that can grow the produce that they can.

DR. LUND: And those are the most…

ASSEMBLY MEMBER MATHIS: That's the spot that we're losing it.

DR. LUND: And those are the most agriculturally productive counties in the state and the country, so… And even those areas have gotten through this drought surprisingly well given the magnitude of the drought. We do need to take some things--take some measures moving forward to make sure that that can continue, that can be sustainable; and the SGMA, I think, is probably the major framework that that's going to occur in because every local area is going to have to do its

own mass balances, make sure that it can supply as much water as it can to meet those needs and then…

ASSEMBLY MEMBER MATHIS: Absolutely.

DR. LUND: …figure out how to divide up the water that's there so that its most--put to the most effective use.

ASSEMBLY MEMBER MATHIS: But the problem is that the water that's there, there's that point where you can't go deeper…

DR. LUND: Right.

ASSEMBLY MEMBER MATHIS: …and there's a point where--and even with the cities this comes into play, that we have cities that are surface water dependent…

DR. LUND: Uh-huh.

ASSEMBLY MEMBER MATHIS: …and we have, and these cities provide the workforce for our agriculture areas. There's a point that groundwater is no longer an option because we can't go that deep.

DR. LUND: Uh-huh. That's right.

ASSEMBLY MEMBER MATHIS: We need to have the ability to provide the surface water to provide the recharge where it is a vital use, because it is.

DR. LUND: That's exactly right.

MS. LESTER MOFFITT: I think it's one of the most important lessons that we've learned in the drought is that every region, every community is hit differently. And I'll pick on the rice industry because Tim has a chance to speak later. But, yeah, so at the 10,000-foot level, we're seeing increases in farm gate values statewide in California, but that's statewide, that's amongst all crops. And as we dig down deeper into regions and communities and specific crops--for instance

rice--there are deep impacts, and that not only has impacts on the farmers and the communities but also the processors and the markets that have been developed. And I think that's an important thing to know. Certainly, the impacts in the communities who are experiencing not only dry wells but, you know, severely high unemployment, you know, these impacts in each community are different and felt pretty hard in some areas. And I think that's the most important thing we need to remember and recognize.

ASSEMBLY MEMBER MATHIS: Now, you just mentioned, you know, loss of jobs with the--on the production side in the processing plants and those. Is that included in your analysis for the job loss on the ag side?

DR. LUND: No. It's in… It works mostly on the inputs to the production. But most of the downstream employment impacts are for the higher value crops, and we've seen less impacts to the production of those crops.

ASSEMBLY MEMBER MATHIS: I think it's important to look at the job loss on the production because…

DR. LUND: Right.

ASSEMBLY MEMBER MATHIS: …as these things, you know, when we're measuring the job loss and we're looking at, okay, this farmer is no longer able to hire these farmworkers to work here, but you're also losing the production at the other end too…

DR. LUND: Uh-huh.

ASSEMBLY MEMBER MATHIS: …because then that--it just shuts down a whole entire line.

DR. LUND: So when we have the multiplier effects, when you have the 20,000 estimate, that includes the multiplier impacts.

ASSEMBLY MEMBER JAMES GALLAGHER: Yeah, just conceptually, when… One way I have really been thinking about this is that you have groundwater, which is really a localized resource, a localized regional resource--and I think SGMA recognizes that--and then you have surface water, which is more of a statewide resource--certainly allocated based on water rights and also based on issues with the delta--but that's more of a statewide resource. And both need help, you know, in order for us to be better prepared for the next drought. And it seems to me, the solution to really both of those is how we manage storm water, how we manage this water that we're getting, the flood waters. I know Senator Galgiani just brought it up, like, hey, when we're getting these flood waters, how can we better manage that water? And I think on the surface water side, if we can capture more of that runoff, we can utilize that for all the different needs statewide, whether it be farms, cities, environmental fish issues, keeping cold water temperatures in the river. So we need to do that end of it, but we can also utilize that storm water and take it to help recharge certain areas. I know people have talked about the Tulare Lake Basin as maybe a potential place to do some of that work and different parts of the Central Valley where we can utilize that storm water we're getting in the winter months and somehow get it to places where it can be used to recharge. So I mean, do you think that's a good characterization of where we need to go, or how would you maybe correct or, you know, add to that?

MS. LESTER MOFFITT: Absolutely, and I think I'm not going to spend too much time on this because I know Daniel Mountjoy with Sustainable Conservation has been actively working on projects for quite some time now on this; and so he'll have some data that I think will be really interesting for you guys to hear later on. But definitely, there's, I think, a lot of potential.

DR. LUND: In Southern California, the urban areas down there have been particularly interested in recharging storm water because, otherwise, it gets lost out to sea, and they have to

manage it on the way out. So they have quite a lot of active engagement there. Well, you can go up into the Central Valley and you can argue that, well, all the big reservoirs are essentially storm water capture too. But you're right, ultimately, our overwhelming source of water in the state is storms. Those storms, you can count them on that graph.

ASSEMBLY MEMBER GALLAGHER: Right, and even on the…

DR. LUND: That's the only we can store them. But, again, California is a very diverse place. If you go down to the Tulare Basin and you try to capture storm water--well, in the valley floor they have about five inches of precipitation a year, so you're not going to be able to capture a lot there relative to other places.

ASSEMBLY MEMBER GALLAGHER: Right, but even with the… You know, like in the Sac Valley, northern part of the state, we have, you know, a reservoir--we have Shasta, we have Folsom, we have Oroville--but there's water that's falling below those…

DR. LUND: Right.

ASSEMBLY MEMBER GALLAGHER: …dams.

DR. LUND: Right.

ASSEMBLY MEMBER GALLAGHER: I mean, I think the estimate was somewhere… If we had, say, a Sites reservoir, we could have captured somewhere around 900,000 acre-feet just in these last two…

DR. LUND: Yeah.

ASSEMBLY MEMBER GALLAGHER: …drought years. That's a lot of water in a drought year…

DR. LUND: Yeah.

ASSEMBLY MEMBER GALLAGHER: …that we could capture and utilize. And then if we can somehow--and I know there's ideas about how we'd do that--but if you could capture the water, the flood waters, maybe out of the delta or some other place and transfer them to places that need recharge, that might be the way because--yeah, you're not going to get that precipitation…

DR. LUND: Right.

ASSEMBLY MEMBER GALLAGHER: …in those areas to help recharge; so you need to get that from the flood water that's happening somewhere else, right?

DR. LUND: Need to get it from where it is. As an engineer, you can do a lot of things. As a policy maker, is it a good investment…

SENATOR GALGIANI: Uh-huh.

DR. LUND: …because all of these things cost; and is it worthwhile--are the benefits you get worthwhile to the investments you have to make in order to do that? We can always de-salt seawater if you're willing to pay $2,000 or $3,000 an acre-foot.

SENATOR GALGIANI: You mentioned earlier that 500,000 acre-feet of land went fallow last year and 400,000 this year. Does that mean 400,000…

DR. LUND: Acres. Acres.

SENATOR GALGIANI: Does that mean in addition to the 500,000 last year?

DR. LUND: No, no, no. It was 400,000 acres last year were fallowed by our estimates and 540,000…

SENATOR GALGIANI: Okay.

DR. LUND: …acres this year due to drought, due to drought. Now, there's another… Normally, there's on the order of a million or 1.2 million acres of land that is fallowed, just normal crop rotations in California.

SENATOR GALGIANI: Okay. Thank you. Any other questions from members?

ASSEMBLY MEMBER MATHIS: Yes.

SENATOR GALGIANI: Please.

ASSEMBLY MEMBER MATHIS: I think one important factor to look at is that within California, with the aqueduct system, with our canal system, we have the ability to move water quite literally in a circle around the valley. And so when we talk about water and where it's going and what it's doing, you know, in these analyses are we looking at the fact that we can move water from one end of the San Joaquin Valley all the way up to Northern California, up into the delta, all the way down the west side and then back around? And these are things that are in place, these are systems that are being looked at. There's, you know, legislation for cost conveyance canals.

DR. LUND: Uh-huh.

ASSEMBLY MEMBER MATHIS: These are systems that we need to be able to move the water, but when we're doing the analysis, are we looking at, you know…

DR. LUND: Oh, yes.

ASSEMBLY MEMBER MATHIS: We spent a lot of this time talking about the problem and not enough time talking about the solution and what needs to happen because we're concentrating on the problem. So as we're doing this--and I know I'm going to be talking to you later on--what do we need to do? And I think that's the real question is what is the actual thing that needs to happen? What is the solution?

DR. LUND: I think the solution is going to be a portfolio of things. You're not going to… It's not… People say all of the above. I don't believe in all of the above because all of the above in a pure sense includes a lot of things where the investment is not worthwhile, but it will be a lot of the above. I certainly believe that. There will be a lot of groundwater management. A tremendous

amount of groundwater recharge will be here. To some degree, I think we have to realize that California is a dry place with a huge population and a huge economy; and we want to keep the fish and critters around. We're going to struggle with water. Not everyone is going to be happy. And how to share that pain is an important policy responsibility.

SENATOR GALGIANI: Okay. Any other questions? Well, we'd like to thank you both. That was very informative, and we appreciate the time you put into preparing for us and taking time to answer our questions as well. So thank you very much.

MS. LESTER MOFFITT: Thank you.

DR. LUND: You're welcome. If you have any further questions, you know where I live.

SENATOR GALGIANI: Thank you. And we will go ahead and call up our second panel at this point in time. First, with us, and this is on adaptive strategies to mitigate--oh, I'm sorry, economic impact on ag communities. We have Maria Elena Puente, Yolo County, California Rural Legal Assistance Foundation; Dr. John Quinto, Assistant Supervisor, and Luis Dan Gonzalez, Senior Administrative Assistant, for Kings Canyon Unified School District. And at this point, we'd like to also call up Tom Zuckerman, who is from my district and active with the delta, San Joaquin Delta, area. Thank you. And would you like to go first, Ms. Puente?

MS. MARIA ELENA PUENTE [through an interpreter]**:** My name is Maria Elena Puente. I am with California Rural Legal Assistance Foundation from Yolo County, and thank you for the, to the committee for allowing me to present my story.

I belong to a family of 12, including my parents; and we work, all of us, in the farm industry, in agriculture. The drought is affecting us because the farmers, the ranchers are getting less land to farm on it; and they are cutting jobs because of the situation; and it's affecting us. Like in the case of my dad, he's already retired; but he has family that needs to work in the farms. Years

ago, my brothers were working eight months; and now, because of the drought, it's been cut that time to four months, half.

SENATOR GALGIANI: Wow.

MS. PUENTE [through an interpreter]**:** I used to live like four months in those migrant camps. There is people that live there for six months. But now, they have to live in the same house, three, four families together, because the money doesn't allow them to do any other things because they have less. The work is not the same. Yeah, and before, the father used to be the only that was working; but now, the mother has to do that, too, that farm work. And they have to leave their kids without, you know, anybody to take care of them. And I've seen people taking out of school their kids, under 18, because they need the help of their little ones to work because of the drought.

Yeah, before this situation, my dad used to work for six months, and now he's only working two months. Even if he's retired, but he has to work on a rice farm.

We farmworkers, we would like more training in different fields and more work for us to do our job. Farmworkers don't get the information that there is other programs that we can do when the situation is affecting us. And like, for example, there is people working on the, with pesticides, and they don't get the information to do it safely, so they get sick and other things. And also because of the situation with the drought, the farmworkers are getting water from other days, that they don't… Instead of throwing the water out, they give us that water, which is not very, you know, safe. Sometimes, we need to stay 12 hours working with only a small water bottle.

We would like to do other jobs in different fields now that the drought is affecting us, but we need more information about what kind of programs can we assist with, can we get training on. One example is that when we work with pesticides, we don't have the proper training, and it's

affecting our health. Too many families are thinking about moving to a different state to have a better life.

That would be my story, and we would like to get help because when we work in the farms that's when you see what's going on because of the drought and how it's affecting us. In my same situation, there is other persons, and we are afraid to talk because we are afraid to lose our jobs and even there is less hours to work, and we need it to keep our families. So we have to accept what the farmers, the ranchers tell us so we don't lose our jobs. Thank you very much for listening to my story.

SENATOR GALGIANI: Thank you. Next we have Dr. John Quinto, Assistant Superintendent--Supervisor. Please.

DR. JOHN QUINTO: Yes. Senator--I'm going to butcher this--Galgiani?

SENATOR GALGIANI: Galgiani.

DR. QUINTO: Okay, Senator, committee members. I appreciate the honor to come speak about the economic impact this has had on a school district or Kings Canyon Unified School District. We serve the K-12 public school needs of about 10,000 students in an area of about 600 square miles. The drought has impacted our farming communities of Reedley and Orange Cove. What we've seen is a three-year decline in enrollment, so there's 238 over the last three years. If you look at that, for us that equates to about $2.5 million in loss of revenue or income. One of the things we do to mitigate that impact is looking at class sizes. And so depending on the community, the 238 students equates to about six teachers; and so we look to mitigate first that way, but also ensuring that we're not negatively impacting their student instruction.

The second thing we do is there's a soft-fall P2 guarantee which allows us to softly fall when we lose revenue in that fashion; so that's critical for us. So thank you for the legislation that

allows for that. LCFF has actually helped us, Proposition 98. We have about 87% lower-socioeconomic students, and so we've actually benefitted from LCFF or Local Control Funding Formula. So as that comes up and you're getting more dollars per student, we're seeing a decline in students. So it's helping mitigate that measure--or mitigating the ramifications of our drought.

Lastly, a cash management plan is mission critical, and so the board takes its fiduciary responsibility very seriously, so they keep a high reserve for such circumstances. So the practice is keep about 18 to 20% so that we can utilize that so we're not impacting any programs or activities for our students.

One of the things we'd like to speak to is--and most importantly to us--is the impact we're seeing on our students. So I think that with the high reserves, LCFF, we can get through; if it's not long lasting, we can get through the $2.5 million loss in revenue and that… But one of the biggest things that we're seeing and why we brought Mr. Luis Gonzalez is to speak on the impact on our students. So if you wouldn't mind, sir.

MR. LUIS DAN GONZALEZ: Thank you. I guess I wanted to speak specifically to the impact on the students that I've seen--specifically, in my time working at Orange Cove High School--from the drought. One thing that I'm seeing is students not being involved in as many extracurricular activities. I am finding that students are having to leave for home right after school to go home to care for younger siblings because--as Mrs. Puente spoke--parents, both parents, are having to work now. Before, where one parent was able to stay at home and care for children, now older children, high school age students, are going home to take care of their younger siblings right after school and not being involved in many extracurricular activities.

In that same respect, high school age students come to school a lot later. And when you're asking them, you know, letting them know how it's affecting their attendance, and you're asking

them what's your reason for coming to school late: well, my parents are leaving to work much earlier now because they're having to go find work further from home. You know, so they have to wake up earlier, dress their younger brothers and sisters and take them to school because the parents are leaving really early in the morning to go find work or get work in farther communities.

Other things that I am seeing is when the younger siblings are sick. Once again, the older-age students are having to stay home with them because--when before when there was plenty of work, one parent was allowed to stay at home to care for the sick child; but now, any work that they're able to get, they're not willing to pass up. So they're keeping home the older students to stay with the younger siblings, and they're going to work.

Also, I've seen, I think, a reduction in parent involvement with the school, once again, because they're working more, later hours, further distances. So you know… And some of the committees that, where we require or request for parent involvement, the attendance in that has gone down also--in support to some of the students that are involved in activities, you know. So the students that we do have involved in sports or after-school activities because they don't have to stay home and care for children, maybe they're the youngest already. So parents are out, you know, working; and they're not able to come to a football game to support their kid because they're out working or because there's not enough money and the money needs to be prioritized to food, shelter, clothing, and not so much to go out and support their kids in some of the extracurricular activities that they're involved in.

So I think that does hurt some of the students that are, and their support, because of the drought. The drought is affecting how much more the parents are working, and the students are being affected directly in that way. Thank you.

SENATOR GALGIANI: Okay. Next we have Tom Zuckerman.

MR. TOM ZUCKERMAN: Well, thank you, Madam Chair. I'm here on short notice…

SENATOR GALGIANI: Thank you.

MR. ZUCKERMAN: I'm going to talk about problems we are encountering and solutions that have been implemented in the delta itself. I come from a long-time farming family in the delta. Starting well over 100 years ago, we've been farming there. I personally have a career up here as a lawyer and a lobbyist but been involved in many agricultural operations, not only in the delta but all over the Western United States and into some foreign countries. So I have a broader perspective on this, perhaps, than the typical tractor-driving farmer might have in our area.

But it's important when you start to analyze impacts on the delta to understand some of the physical factors involved. The delta is nominally at sea level, so there's never an issue with water in quantity. If the outflow coming through the delta from its tributaries is insufficient to repel the ocean, the ocean comes back up into the delta, pushed by the tides on a diurnal basis. So the issue of water in the delta is one of water quality, not of the presence of water, and that has been true historically; and it's certainly been true during the current drought.

Salinity intrusion is an issue that we look at very carefully. We were to receive protection from both the federal Central Valley Project and the State Water Project as conditions of their construction. Part of their basic purposes were to provide salinity control in the delta area. We have what are considered to be very senior water rights, based largely upon riparian usage but also on pre-14 and post-14 appropriations that have been filed by our area.

And primarily the basic protection is provided by the common pool concept that unless the water quality in the delta is maintained at acceptable levels, it's unsuitable for export from the delta because of the point of diversion that takes place in the southern portion of the delta. So historically, the State Water Resources Control Board has established water quality standards not

only for fish and wildlife uses and domestic uses but also for agricultural uses in the delta. There are critical-year relaxations that are based upon historical droughts. Unfortunately, what seems to be happening, instead of adhering to those critical-year standards, which were designed for those purposes, every time we encounter a drought, which--as Dr. Lund pointed out to you--has been eight times in recent history, we get declarations of emergency from the governor's office. And typically, all bets are off at that point. This year, the state board instituted relaxations in water quality standards in the delta that amounted to taking about 1 million acre-feet of water that might ordinarily have flowed out of the delta and help repulse salinity to the export projects.

So it's a mixed bag. I know people down the valley tend to think that the delta is, you know, taking all their water. Well, we look at it the other way around. And the promises that were made to the area are hard to enforce, and so we rely very heavily upon this common pool concept where we will share in the hardships but not be victimized by them.

What happens to us in a salinity intrusion situation is that the salt water concentration, salt concentrations in the water, increases, and particularly towards the western delta. The accumulation of salt in the soil may not necessarily impact the current year's crop because it's late in the season, that the crops are more tolerant of salty water late in the maturation, but they accumulate in the soils. And the Deputy Secretary of Food and Agriculture was talking about this being the year of soils. Well, soils are not happy in the western delta and in the delta generally this year because the combination of increased salt in the water that's being irrigated and the methodology that's used which is sub-irrigation. It's not top irrigation, which can enable you to wash salts out of the soil with excess irrigation, but it works the other way. The plants have their own mechanism for not absorbing salt; and they leave it in the root zone, and the soils get very salty. This is an issue for drip irrigation all over the state as well; and unless farmers in mineral soils that utilize drip

irrigation employ methodologies for over-irrigating their soils or leaching the soils, they're going to end up with very similar problems after periods of use. So it's a generalized problem.

The way that we responded to this in the delta this year, I think, is illustrative of the willingness and ability of people to work together as much as possible in tough times. There was a program that was adopted voluntarily within the delta this year to--by most of the farmers, all the ones that I'm familiar with or most of the ones I'm familiar with--to voluntarily reduce their usage by 25%. And the way they did that, and it was many times because it was in concern about not only the buildup of salts if they did irrigate, but also there were threats coming from the State Water Resources Control Board of curtailment of these senior water rights uses, which the lawyers in the area said were inappropriate; but nevertheless, in order to avoid a fight over the thing, this program was signed up and, as a consequence, the state board did not come down and attempt to curtail water rights diversions against the people, at least the ones that participated in the program.

The way they were able to do it was through a combination of fallowing and to some extent cutting off irrigations that might otherwise have occurred later in the season, particularly as the water was getting saltier; and that worked in a couple of ways. One, if you're, if a farmer had, for instance, alfalfa, they just didn't irrigate the last one or two irrigations and that had an impact upon the amount of hay that was produced on those crops.

Another interesting way that it happened was, because the dairy farmers were running up short of hay to feed to their animals, they were more interested in siloing corn--green chopping corn and making silage out of it--which is a substitute crop for the dairy animals that has the impact of allowing you to harvest the crop well short of its normal maturity and, again, save the irrigations that would have taken place later on in the season.

Now, back in the early ‘90s--I think it was either ’90 or ’91--we had a drought; and the state instituted a drought bank program. I don’t know if any of you are old enough to remember that…

SENATOR GALGIANI: What year was this?

MR. ZUCKERMAN: It was either ’90 or ’91. And people were actually paid to not plant crops in the delta. It was--sounds questionable whether it was very effective or not. And in the subsequent year, a group of us suggested a program to the Department of Water Resources and the Department--at that time, of Fish and Game--now Fish and Wildlife to do a crop-shift program--where instead of farming crops that were irrigated during the summer, shift to either winter-irrigated crops like wheat and barley and so forth or crops that didn’t require any irrigation during the latter part of the year when the water really begins to get short. And that was a very effective program. We were able to save about 1.5 acre-feet per acre of the lands that were put into the program. Unfortunately, the year in which it was instituted turned out to be a wet year, and so the people that paid the people in the delta not to do this…

SENATOR GALGIANI: Oh, yeah.

MR. ZUCKERMAN: …were a little bit disappointed with it. But all the reports that were done on it showed that it was very effective. So that’s something that could be done in exigencies off into the future.

A couple of things that you need to understand about this drought situation though is that the system is inherently short of water. When the State Water Project was proposed to the people, it was recognized that sometime around 2000 it was going to begin to run out of water; and the amount of water that had been contracted for sale south of the delta and into the Bay Area, and so forth, was going to end up being about 5 million acre-feet short because of… And they anticipated developing that 5 million acre-feet of water through additional storage projects at that time on the

North Coast rivers, by and large. And then along came the Wild and Scenic Rivers Act, and so forth, and that was all put, you know, out of reach. So the system, as Dr. Lund says, ends up being about 8 million acre-feet short this year, and that 5 million acre-feet is a big portion of that.

So these kinds of events are going to happen with increasing frequency as we go forward unless we do something dramatic about it. The most obvious thing--and the thing that those of us in the delta have been preaching for at least eight years now--is the integration of storm water management with groundwater recharge. And there's a… There's an enormous capacity that's been created by overpumping in the valley. It's estimated to be at least a half a billion acre-feet of available storage in the San Joaquin Valley alone that could be utilized to take not all, but a significant portion of the water that is going to be falling largely as rain rather than snow now and trying to figure out ways to utilize historic flood plains, which may be farm now; but you can flood them on a seasonal basis, if they don't have permanent crops that would be destroyed by it, and really get serious about putting some water down in the bank that we will have to use to alleviate these problems with the jobs on the farm and the kids in the schools and so forth and not be in this boom-or-bust type of situation that we have today.

The last thing I want to point out to you--and I would have been more succinct if I had more time to prepare, I suppose, but I apologize for taking perhaps more time than is reasonable--but a lot of people don't understand this one simple fact: that if farming becomes uneconomical in the delta, there will be nobody there to maintain the levy systems. And we get a lot of water into the island from seepage, and we have huge drainage systems on all these lands that pump all the water that we don't use back into the channels. And oftentimes, we're pumping more water back into the channels than we're actually diverting onto the lands, depending upon the time of the year and the seasons. If that… If there isn't somebody there to do that, these islands will fill up with water. The problem

with that is that the evapotranspiration uses about 40 to 50% more water than we do in farming, so the consumption of water in the delta will increase by that amount if these islands are not maintained in agriculture or at least in a nonflooded circumstance, which will even be worse. It will add to this shortage that we have in the system today.

The other thing we need to realize is that when these crops are not, are not grown or if, for instance, if they're harvested early like the silage corn deal, there's a lot of habitat--and for terrestrials and water fowl and so forth--that isn't there also. There was an article in the *Sacramento Bee* over this last weekend about the stress on the water fowl populations as a result of not having the flooded rice fields that would ordinarily have existed. Well, that is also true with these areas that have gone from corn where there is waste grain in the field after the corn harvest to a green chop deal where it's a scorched earth-type situation for the balance of the summer. So there's a lot of aspects to this that you need to keep in mind as policy going forward, and I think that's--I've probably exhausted my time and more. Thank you very much for your attention.

SENATOR GALGIANI: Thank you very much, and thank you for participating and preparing on such short notice. We had another panelist who had a family emergency and Tom Zuckerman is filling in for her, so I appreciate that very, very much.

MR. ZUCKERMAN: And I didn't have a chance to talk to Barbara. I had no idea what she was preparing to say, so I hope I didn't get too far off the subject.

SENATOR GALGIANI: Well, thank you. Thank you. It was very helpful, very informative. Thank you.

Okay, so we have any questions of these panelists from any of our members?

ASSEMBLY MEMBER PEREA: I'll ask… I'll start if you don't mind.

SENATOR GALGIANI: Okay.

ASSEMBLY MEMBER PEREA: Just a quick question, Madam Chair, for our representatives from Kings Canyon. First, welcome. They're my constituents…

SENATOR GALGIANI: Okay.

ASSEMBLY MEMBER PEREA: … at least for the next four weeks. I look forward to… You know, it's been honor to work with you and serve you for the last five years and for the rest of this year.

But what I wanted to talk to you about is, you know, you brought up some of the real world impacts that are facing families, kids, schools as a result of work not being as available. I'm wondering, have you all thought at a very grassroots level, are there any state policies or state budgetary requirements that could maybe be changed, loosened up, you know, to allow more flexibility for you as administrators to deal with sort of the real world impacts that are occurring due to the drought with your students?

MR. GONZALEZ: I can't think of any right now.

ASSEMBLY MEMBER PEREA: Okay.

DR. QUINTO: One of the beauties with LCFF, the new funding formula, is the LCAP, the Local Control Accountability Plan; and so it actually promotes going out to the communities and getting feedback. The tension is between--as Mr. Gonzalez brought up--was trying to get people to the table to talk about what activities. So there's some funding in the supplemental concentrator portion of the LCFF that would allow the flexibility, but it's getting those participants to come in and how do we do that. Is about coming through and helping feed them? So can we provide after school programming? Could we come in with some kind of a breakfast program? But trying to get them to come in to speak about it has been the challenge, sir.

ASSEMBLY MEMBER PEREA: I see. Well, I would just encourage you as administrators… I mean, I know you have a lot going on every day and this is one more thing that you have to deal with; but I would encourage that, you know, should the community be able to come together and administrators able to lead through this, these challenges, if there are policies or funding strategies that are, or funding that is making it harder for you to do your job in this time of crisis, I would encourage you to consider working with the state and doing maybe some pilot projects that could serve as, you know, opportunities for the state to re-look at things that we're doing that may in fact be restricting you from serving your students. So it's just something to think about. Look, I know you've got a lot going on and there's, you're always putting out fires; but if there is the ability for someone within the district to take that lead and to do that, I would encourage you to do it because I think you have lawmakers as well as regulators and others in the state who are looking for ideas and who are looking for opportunities to better serve. And I think those ideas have to come from the grassroots because you're dealing with it every day when you go to work. And I think as you, as you look at, you know, those challenges, I think if you had the opportunity to pitch some new ideas to the state, I think you'd have a lot of people who would be interested in helping put those together. So just some encouragement.

DR. QUINTO: Thank you. I'll bring that back to cabinet.

ASSEMBLY MEMBER PEREA: Sure.

DR. QUINTO: We'll [inaudible].

ASSEMBLY MEMBER PEREA: Thank you.

SENATOR GALGIANI: Assembly Member Mathis?

ASSEMBLY MEMBER MATHIS: I would like to thank the gentlemen from Kings Canyon Unified School District. I, myself, am a Reedley High School alumni, and I represent part of Orange Cove, so…

DR. QUINTO: Pirates.

ASSEMBLY MEMBER MATHIS: And to echo what Assembly Member Perea just said, I mean, I know Henry's going to be leaving, but I will be around, hopefully, for the next decade, so by all means, contact me.

And, sir, your comments on the delta were spot on, as well.

And, ma'am, my condolences. You should not be in that environment. And one of the things I look at is, with our schools, with our families, what are the things that we can do to help as this drought continues. And the fact that we have people that are living in, quite literally, Third World conditions in the state of California is just not okay with me. Thank you all for being here.

DR. QUINTO: Thank you.

SENATOR GALGIANI: My question to Ms. Puente, you mentioned that you're not trained on how to work with and handle the pesticides. What kind of conversations are held between the workers and the employer when spraying is to occur? Are you notified in advance?

MS. PUENTE [through an interpreter]**:** There are sometimes they give us advice on how to use the pesticides; but others, they just put an English sign outside. And if we don't know the language, we cannot understand what they are saying; so we just do what we think we should do.

One time, we had to throw some pesticides on pumpkins and crops; and it was a woman that was expecting, and I refused to do the job because I saw that it was unsafe to do that; but they asked you to do it anyway.

SENATOR GALGIANI: She was asked to apply to pesticide?

INTERPRETER: Yes, uh-huh, and she refused to do it.

SENATOR GALGIANI: I guess I'm not… I didn't think that the farmworkers were the ones who were supposed to apply the pesticides.

UNIDENTIFIED FEMALE: That's not what she said.

INTERPRETER: What?

UNIDENTIFIED FEMALE: It depends on the pesticide [inaudible].

MR. NOE PARAMO: If I may just add…

SENATOR GALGIANI: Please.

MR. PARAMO: …a translation.

SENATOR GALGIANI: Please.

MR. PARAMO: She was giving an example of a situation where it was an experimental crop, and it has to do with the pumpkins. And so in this experimental crop, they were trying to apply pesticides; and they asked these two women--Ms. Puente, who has asthma, and another woman, who was pregnant--to do it, and without having the proper training, told her to apply it. So in this experimental situation, they said no, and that's why the complaint.

SENATOR GALGIANI: I see. I see. Okay.

MR. PARAMO: Thank you.

SENATOR GALGIANI: Thank you. Well, you should have a safe work environment. And clearly, I need to better understand what occurred in that situation and what should have occurred and how it could have been done and should have been done correctly.

MS. PUENTE [through an interpreter]**:** Yeah, I think I should have had better advice on how to utilize the pesticides; but the supervisor that I had at that time said, "If you don't do the job when I have the opportunity, you're going to be fired."

SENATOR GALGIANI: Okay, we'll have to have a background talk on that after the hearing.

We have a question from Assembly Member Gallagher?

ASSEMBLY MEMBER GALLAGHER: Yeah, one. I just wanted to say, you know, I think this is a great panel because this really helps put the human face on the drought. I think a lot of times, and especially maybe for members that--you know, sometimes I wish we had a lot more members here--members that don't have agricultural districts, when we have this impact to agriculture and that industry, you know, a lot of times people just see numbers; but they don't see, like, the impact it has on families and the pressures at home of losing jobs or being worried about, hey, am I going to have a job tomorrow; the impacts to the school system; the impacts to the economy, the local economy and, you know, people spending money locally. It's huge, and so I really appreciate you guys really highlighting those issues, and I think that helps inform, better inform the policy-making process.

Specifically to the delta though, I wanted to ask you, Tom, about, you know, the idea you were talking about in terms of using that storm water for recharge purposes. Would the cost of that be that significant considering that we do have a lot of infrastructure already that moves water out of the delta? And I'm assuming you're talking about in the winter months when we have flows going into the delta, we could take, capture some of that water, take it through an existing infrastructure. And where are you talking about maybe placing that in terms of recharging basins?

MR. ZUCKERMAN: Well, I have some direct knowledge on that which may not be comprehensive, but let me give you an idea. I live on a piece of property that has about 300 acres of ephemeral lakes on it. It was… It was too much water, too many trees, too much variation in terrain to ever get leveled for farming. And we have a disappearing groundwater table on the north side of

the Mokelumne River--this is between Lodi and Galt--and after I wrote this paper that I referred to, eight years ago, I said, "Geez, we could do this right here." So we got organized. We talked to all the people involved: East Bay MUD, the state people, the local districts, the Audubon, the Sierra Club, and everything. We've actually put in a project now to divert water that would otherwise go to waste under some unexercised filings that the North San Joaquin Water Conservation District had. That project has been completed now. Now, all we're waiting for is some water, the rain; and East Bay MUD is going to hold that water in Camanche Reservoir, release it to the district on their request, put it in the lakes. The local grape growers around the property are going to irrigate directly out of the lakes when the water is available instead of pumping the groundwater. And by doing some excavation in the bottom of the lakes, the groundwater penetration is going to increase. The engineers have calculated that we're going to save 5,000 acre-feet of water from groundwater pumping on an annual basis, which is precisely what the amount of overdraft is today that's being created by the city of Galt--the Galt metropolitan area's usage--so we will have solved, you know, that groundwater overdraft problem locally. Now, that was without any opposition from any interest in the, in the community.

Now, when I wrote the paper in 2006, 2007, there were 225 applications for local groundwater projects before either the State Water Resources Control Board or CALFED at the time that were sitting there without funding. It gives you some sort of an idea of the local opportunities for groundwater recharge.

Now, I'm working on a program now with a bunch of interests at the Paradise Cut area down south of Tracy…

SENATOR GALGIANI: I see.

MR. ZUCKERMAN: …which would create an improvement of that storm water flow deal. It would protect the city of Stockton from flooding. It would spread the water out as it comes down the San Joaquin River in agricultural lands at times when they're either not being utilized or, you know, the water carries enough oxygen that the vineyards and so forth--as long as it doesn't stay, you know, it keeps moving and stuff.

ASSEMBLY MEMBER GALLAGHER: Right.

MR. ZUCKERMAN: It's a seasonal thing; and it will do a remarkable job of increasing environmental opportunities, flood control opportunities, and water conveyance opportunities.

Now, those kinds of things are available. The problem is that we've, as a state we've got our eyes focused on these crazy, you know, generations-old projects, which I promised I wouldn't mention here at the hearing today by name…

SENATOR GALGIANI: The "T" word.

MR. ZUCKERMAN: …and we've been diverted into thinking that this is a solution to our water problems, which it isn't because it doesn't provide the additional water that we need to solve these problems, those problems, and everybody's problems around the state. So if we can get rid of those dreams and get onto something realistic, I think maybe we have a chance of solving these problems. Sorry for the lecture, but you… I [overlapping]

ASSEMBLY MEMBER GALLAGHER: It was good. The only thing I disagree with is I think we need to do a little bit of both.

MR. ZUCKERMAN: Well…

ASSEMBLY MEMBER GALLAGHER: I think a Sites [Reservoir] combined with what you're talking about would work very well.

MR. ZUCKERMAN: Well, I have no…

ASSEMBLY MEMBER GALLAGHER: But, yeah…

MR. ZUCKERMAN: I have no problem with Sites. I think the one where they divert the water directly from Shasta down into Sites would better than coming up through the river, but we could talk about that some other time.

ASSEMBLY MEMBER GALLAGHER: We'll talk about it [inaudible]. There's a lot of [inaudible]. Thank you.

SENATOR GALGIANI: Okay. Seeing no further questions, I want to thank you for your preparation and for being here today and to be informative to this hearing. I really appreciate you. Thank you.

MR. ZUCKERMAN: I'm going to steal some water; is that okay?

SENATOR GALGIANI: Yes. Don't waste it. [Inaudible. Break for panelists returning to their seats.]

SENATOR GALGIANI: The third panel is on adaptive strategies to mitigate drought impact, and we have David Zoldoske, Director of the Center for Irrigation Technology at Cal State University, Fresno; Robert Tse, State Broadband Coordinator, Strategy for Ag Technology and Innovation with the United States Department of Ag, California Rural Development; third, we have Daniel Mountjoy, Director of Resource Stewardship and Sustainable Conservation; fourth, Tim Johnson, President and Chief Executive Officer, with the California Rice Commission; and David Daley, owner/operator for Daley Cattle. And I believe David Daley needed to make his presentation first, and we're happy to have you here today. Thank you for joining us.

DR. DAVID DALEY: Thank you very much for the invitation, I appreciate it; and thank you also for allowing me to go just a little earlier. I think Anne's aware that there's been some challenges at home, so I need to move fairly quickly…

SENATOR GALGIANI: Absolutely.

DR. DALEY: …after I leave here, but thank you.

I want to approach this slightly differently and try not to be redundant and also be brief at the same time. As a California cattleman, I am a producer, California cattle industry. I am also the first vice president of our California Cattlemen's Association. I have another role serving as the interim dean of the College of Agriculture at CSU, Chico. So I was trained as an animal scientist so I look at this at multiple ways. I would like to address this primarily as a producer. I'm a fifth generation producer in Butte County, California; so Butte, Yuba, and Plumas is where I run cows. We happen to be in a wet part of the state, or it's supposed to be. Our permits for cattle to go to the national forest and to the logging and to private ground is east of Oroville on the Plumas National Forest. That's roughly 100,000 acres of summer range that should be filling the Lake Oroville in a normal year. I run between the south and the middle fork of the Feather, so we would expect normally 90 to 100 inches of rainfall in that area, so where the wet part should be. I drive across Oroville's dam or close to it every single day so, obviously, I get to see what the rest of the state is dealing with--without--with an empty reservoir.

So my background in terms of a producer, some of the things that have impacted us directly is we really run in those marginal lands on both sides of the valley. The California cattle industry, I'm a range producer. We don't irrigate, typically. We work on what the natural rainfall should provide or we expect provides, and so we end up dealing with essentially the oak land savanna. The foothills up to the pine timber is where we anticipate that we're going to run cows. We don't have an option to irrigate. Most of California's surface water, falls, will cross California's working landscapes, our range operations, and that's what we have to protect and are very proud of how

we've managed. It's the home to most of the state's endangered species. It's a place for carbon sequestration. It's a place that we need to protect.

Just as a quick aside: I was asked in my role, not as a producer, but as a dean of a college, "Well, can we talk about the water shortage?"; and they came to interview me, local journalists. And I talked to them about a shortage of feed, I talked to them about hauling water; and they said, "Why don't you just irrigate those hills?" That's our lack of understanding in terms of what we're dealing with, and that's from someone… Luckily, I don't think that one made it to press--we're hoping. But that's the understanding that we deal with.

So we're faced with a situation where--personally, I'm on the Plumas National Forest--we had a 20% cut in our AUMs, our annual, our animal unit months are 20%, in terms, less, in terms of the cattle we could take up this year. That was standard throughout most of the Sierra Nevada. So it was a fifth of our ability to move to those ranges. The private land, Sierra Pacific Logging Corporation, who I also lease ground from, did the same thing, another 20%. So we removed 20% of our operation or our summer feed in one regulatory decision that was not necessarily based on science, and those are some of the things that we deal with on a regular basis.

In addition to that impact, for the first time… I'm on the east side of the Sierra, or the east side of the Sacramento Valley, so for the first time in my life--and I remember the '75 to '77 drought pretty well--I was a senior in high school--but we never had to haul water then--we're hauling water, drinking water, for the very first time. There's an inability to fill stock ponds. It's a pretty dramatic impact that impacts us in a situation where we've had to see liquidation of cowherds from California, and this is throughout the state.

One of the things that people I don't think connect to, it's… Think of it more as a permanent crop. You can't replace that genetics. I can think of one major producer in California who moved

600 cows to Nebraska. They won't come back. That was a million dollar move, $100,000 just in trucking. It's the potential for that impact to the economy. Now, he's still keeping an operation here, and I hope he stays because he's one of our best in the state. But 600 cows is a pretty significant impact to a local economy if you're talking a million in calf sales a year from one small community.

So what we'll see as a challenge is--we see this, and just sitting here--the complexity of this issue is so overwhelming. Good luck, folks. I mean, it is a huge challenge, and I realize there are no simple solutions. But we are faced with a situation in rural communities that we have to think creatively, and I think our great concerns are that the solution could become a problem. And I'm speaking as a producer, that well-intentioned solutions may cause greater problems for us. And as first vice president of California Cattlemen, there's probably three things they would ask me to speak to--and I realize this is not one that's going to have unanimous support around the table--but water storage is a thing that our members still believe, whether it's a solution or not, it's partial solution--more cups on the table, more sources. And I know Assemblyman Gallagher has raised the issue already of Sites. Frankly, I'll tell you our membership who voted for Prop 1A with a heavy lift by much of agriculture feels it was a bait and switch. I feel a lot of pressure when I go out and talk to our members that it will never happen because the state doesn't have the political wherewithal to get it done. And we recently, at our California Cattlemen's convention about three weeks ago, actually passed a staff directive instructing our staff in Sacramento to raise the issue on water storage every single opportunity they can, get us updated, let us know where you are, let us know if it really has an opportunity to move forward. And I recognize it's not a single solution, and I'm not suggesting that, but I assure you in our part of the world, Assemblyman Gallagher, you

have great support for anything you could say about Sites on a continuing basis, and you'll probably get that continually from our people.

And then secondly, I think we are greatly concerned about the level of regulation that we deal with both from the state Regional Water Quality Control Board and the regional boards themselves, who act independently and put us in onerous situations simply to meet regulations and frequently without science, and that's an ongoing problem that our members are concerned about with water. We've had several challenges recently. Some of you may have participated last year or heard about the Grazing Regulatory Action Program, for example. So regulations are a concern for us.

And then thirdly, there is great concern that in this time of severe drought, a very complex issue, we can't look for simple solutions when it comes to water rights and historic water rights and what those may mean to us as producers and people who work in rural economies. Frankly, changing those water rights significantly could collapse rural economies significantly.

So those are our greatest concerns, and if I were to reiterate those, it would be water storage, the level of regulation, and then what we do in terms of whichever last one I just offered. And I'm sorry, but I really do have to run fairly quickly, and I apologize, but it is a personal family issue.

SENATOR GALGIANI: No, I… We're grateful that you're here and that you were able to do this…

DR. DALEY: Well, thank you.

SENATOR GALGIANI: …and contribute.

DR. DALEY: And thanks for inviting me.

SENATOR GALGIANI: Thank you very much. You're very welcome. Thank you.

Next, we have David Zoldoske, Director for the Center for Irrigation Technology at Cal State University, Fresno.

DR. DAVID ZOLDOSKE: And thank you for inviting me here today. And I think our assignment was adaptive strategies to mitigate drought's impact, so I'm going to share some thoughts primarily on-farm about that, and there are things we can do. I know we get kind of drug into some of these giant issues, and there's a lot that can be done and should be done, and I'll address those.

While I'm here representing Fresno State today, I also represent the Cal State University system. We have 23 campuses and 300 or 400 faculty members actively involved in water issues across the whole spectrum of saltwater intrusion to constructed wetlands to, obviously, irrigation. So think of us as a resource for the state. I think sometimes we are a best kept secret, and I want to assure you that through our Water Resources and Policy Initiative, which the chancellor initiated in 2008, we are ready and able to help the state through these difficult times.

So with that, I want to start off by talking a bit about basin efficiency and on-farm efficiency. My conversation today is going to be about on-farm efficiency. Those two concepts get interchanged. We do get basin efficiencies that are quite high, and what that really means is that over-applied water goes back to the groundwater and is not lost and can be re-used another time. On-farm efficiency which the grower uses to grow the crop is a different matter, and I think that's what I'm going to address today. There are lots of opportunities there, I believe, to improve water use efficiency on-farm and has multiple benefits.

One of the questions I like to ask panels like this: who believes that drip irrigation uses less water? And most of the time, everybody raises their hands, when, in fact, drip irrigation plants use more water. And so you should understand that there's this big myth out there that somehow drip

uses less water. Now, how can that be? Well, it's more efficient in the sense that all the plants get more uniform applied water and we get yield increases, and that's why you hear about increased production with drip irrigation. It's not because the crops use less water, but the plants actually use more water.

What it does do when it's operated correctly and maintained correctly is that the system then applies water more uniform and less water moves beyond the root zone, which we can see with flood irrigation, but that's not to say that drip irrigations can't be mismanaged and don't waste water. Lots of them do, and we've got lots of data to show that.

Additionally, we like to also make sure that when we talk about "recharge," that is with surface water. When you're using groundwater and inefficient with it, all you're doing is recirculating the groundwater back to the ground, and so there's no net benefit to the groundwater. In fact, there is a net negative to that, and how does that occur? One is that if we over-irrigate with groundwater, we tend to degrade the water quality. We take with it pesticides, chemicals, other things that might be found in the agronomic growing of the crop. So be mindful that when you hear that, that you need to understand the source of the water because if we're inefficient with groundwater, there's no recharge per se.

In fact, I would say the other cost to that is pumping cost because what happens is there's a latency or a time delay from the time that over-irrigation occurs at the crop and below the root zone and the years it may take to re-enter the groundwater. And during that time, there's a delta in increased groundwater lift because that water hasn't recharged yet, and so you're actually lifting up from the decrease in groundwater level. So be mindful of that as well.

I want to talk to you about what we like to call our three big ideas, what we really think are the things to focus on if we want to improve on-farm water use efficiency, the first being pumping

efficiency. You now know that probably the majority of the water used to irrigate agriculture in California is from groundwater since the surface waters currently have been significantly reduced; and so relatively small changes in increase in pumping efficiency can provide large increases in water efficiency--excuse me--energy efficiency and in some effect water efficiency. Fresno State manages a problem, a program for PG&E called the Ag Pump Efficiency Program. And currently, we are reducing pump run time by 2 million kilowatt hours a month through that program and conversation on a one-year basis. After that one year that we are able to benchmark, those savings come on for the growers or for the utilities. We actually provide the same services to the utilities.

What does that really mean? It seems it means that the average pumping efficiency in California is somewhere between 53 and 55% efficient. Theoretically, it can be up to 65 or more. What you've got is losses in the motor heat bearings and pump efficiency losses combined. Our average pump efficiency of about 25 or 30 thousand pump tests that we've performed through our program is in the 53 to 55% efficient. And pumps that we encourage to get repaired are down around--started, when we started the program 10 or 12 years ago, it was down around 40% when the repair would occur--and we've been able to, through education to farmers and water districts, move that up to 45%. So we've increased the pumping efficiency on pumps that are repaired by 5%. That's a big number when you think about the hundred thousand ag wells that are out there.

But along with that, we, our estimate is that maybe one-third of the ag wells have water meters; and I would encourage this group to consider advocating for water meters. I know that's a hotly debated question mostly because, I agree, that once the meters are in and we report the groundwater extraction, we will be taxed on that and that water will be used to enforce, I'm sure, the groundwater or the SGMA. But at some point, it's the tragedy of the commons if we don't get a hold of that; we're going to be out of business anyway. So along those lines, there is obviously

another 70,000 ag wells that can have pump--excuse me--water meters on it. Why is that important? Not only to tell you what you're putting on in the field, because what gets measured gets managed--and there's a reason why the legislature has required all urban users have water meters--and how we can benchmark water conservation, water management; but more importantly, beyond just the idea of knowing how much water you put on, it's change in pumping conditions. When we see the flow rates change in a well, that alerts us almost immediately that something has degraded in the system. Now, it might be a falling water table, it might be a plugged filter, it might be a worn pump; but it alerts the operator then to make, take action immediately and not at the end of the year when they look at how they've run their pump and say, gee, I ran 20% longer this year, why was that? And so that potential savings from a 3 or 4% degradation in the operating efficiency to maybe 10 or 15% can be caught early and maintain better use efficiency both with our water and energy resources; and that's important to everybody in the state, including the grower. And any of these irrigation systems, particularly in drip micro, again are dedicated to a certain flow and pressure; and as those systems degregate, the flow and pressures then are not appropriate for that design of that system.

Drip systems are highly touted as being efficient and come in at 90% or higher. Two things of interest to that: Almost none of these systems are ever tested when they are installed and operated for the first time for how well they are distributing the water; it's an assumption. It's a back-of-the-envelope calculation. And secondly--and probably most concerning to this committee--should be that those systems do degrade over time. We've got lots and lots of data--of the 3 million or plus drip microsystems out there--that 10, 15 years down the road they might be 30, 40% efficient, not 80 or 90. And, in fact, sometimes they can be much worse than adjacent surface irrigation systems because the emitters do plug. And what do we do? We continue to run the system a little longer to

overcome those non-uniformities, and all the benefits then are touted to drip and micro are lost. And so one of the things we want to really promote is education, and I'm going close with that--right after I get past the third leg of the stool. So maintenance is very, very important to drip micro and understanding how to evaluate those systems.

And then thirdly, water management. In fact, that's the low-hanging fruit. We see lots of conversations about drip emitters and other things that allow to manage that system. A, if you don't have a flow meter, it doesn't--having a soil moisture reading does not really tell you if that number actually corresponds to what the crop should have been applied in that given day. It just tells you what water is available at that location. Those devices can be very expensive. You may only have one in 40 acres, and so you really are taking a very educated guess as to what the management should be on that. So I want to encourage that the education--when the state provides funding for equipment that education be a component of that. If you get a piece of equipment that's been subsidized or rebated and you don't know how to operate it properly, almost assuredly, you're not going to get the full benefit. I would liken that to my phone. It has many, many features that I just don't know how to use and may or may not ever use them, on a need to know. And I would suggest to you, that's very similar with lots of irrigation equipment, water meters, soil moisture sensors, weather data, etc. So… And I know that the programs that are being run by the state primarily focus on equipment and matching funds, but I would strongly, strongly suggest to this committee education. There's a reason we have universities and extension and that is to make sure that things are done properly and that at the end of the day we get full benefit from our investment.

And the last thing I would say is that the whole idea of getting water meters on all our wells and from the standpoint of the state's rationale--because we're never very targeted or strategic in my view on how we provide these rebate systems, they're pretty much scattered across many, many

areas--and that is at the end of the day if, in fact, SGMA requires the reporting of groundwater extraction the state then has instituted a plan to make sure that every well has a water meter so when that day comes that that data is important to have, what have we done? We've created the backbone or the infrastructure to make sure that data is available. And as I heard earlier speakers say--and I would support this 100%--is that we don't have enough data to manage our water supplies on-farm and off-farm, and we've got to move in that direction. So, sorry if I've gone long, but I wanted to make sure I got the whole story in.

SENATOR GALGIANI: Thank you very much. We appreciate that.

And next we have Robert Tse, State Broadband Coordinator for the Strategy for Ag Technology and Innovation with the United States Department of Ag, California Rural Development.

MR. ROBERT TSE: Thank you for inviting me to this hearing.

I'm coming at this from a different, somewhat different angle than probably all the other speakers, in my role as the broadband coordinator and also previous roles at USDA. But before I start, I think it's important to set very briefly the global and national context we are in because you have to understand that then to figure out how we better should deal with the drought and the other issues.

If you look globally for--and this affects California agriculture--there are four basic global drivers taking us to 2050. One is global population increase. One is rapid urbanization; half the world now lives in cities. There's a growing middle class around the world, and there's a climate change impact that's going on. There are four long-term trends in response to this: rising food prices; rising global trade of food; rising demand for protein, fruits, and vegetables--which is

exactly what California produces. And we see agriculture adapting to climate change which is, you can read drought into this as a factor of that.

Nationally, California is the top agriculture producing and exporting state. California ag production in 2013 was 46.4 billion; far greater than number two, which is Iowa at 31.2 billion; more than twice that of Texas at 21.6. I just toss that in because we hear about Texas all the time. And California ag exports were a record 21.2--and you heard that earlier--billion in 2013. California agriculture, like its population, is notable for its diversity, makes it distinctive from the rest of the country with 400 different crops grown. An estimated one-half of U.S. fruits and vegetables are grown in California. Two-thirds of the world's almonds are produced in California. This success, and it's a long-term success, is due to a mixture of the Mediterranean climate that we have plus innovation, risk taking, and adoption [sic] by California farmers. California agriculture is simultaneously both local, farm to fork, and feeds the state, nation, and world--so you have this combination.

But the drought comes in as a major disruptive event. The fifth year of a drought--could be longer--has disrupted the status quo and for purposes here has disrupted the status quo in agriculture--its water supply. One hundred percent of the state is in drought. Exceptional drought and extreme drought cover the entire Central Valley, which produces 75% of California's ag production. Another way to look at it is we are the drought equivalent of--if you are a Garrison Keillor fan, when he talks about Lake Wobegon where all children are above average--all of California is above average in drought in terms of status. That's not the greatest thing to have.

I think you've already heard enough--some details about the numbers and the drought impact--before. I would say the two figures to be of concern about is the increase in fallow land

from the 400,000 acres to over 500,000 acres, or up 32%, and the discussion about job losses. The estimate is 17,000 in 2014 and rising 9% to 18,000 in 2015.

But there's a greater drought impact beyond the amount of fallow land and number of lost farmworker jobs. You've heard that in the previous panel, and I would just kind of like to rephrase that as well because I was at a roundtable in October, a farmworker roundtable on drought in the San Joaquin Valley, and, again, in that meeting there was direct individual description of the impact of the drought. They put a human face on the drought beyond the macro numbers that I typically would look at. But I'll just summarize what they said and what you also heard before, that there is a disruption of the farm labor market. It's not just unemployment of farmworkers. Because of changes in the types of the crops grown and the resultant change in the number of farmworkers needed for those types of crops, it's actually quite disruptive of the status quo. And there are changes in the nature of farm work, which I'll get into more in a second. In some cases, a lot less farmworkers are needed per acre, so that's part of the disruption of those who are already working. And, you know, part of the disruption in the local rural communities is that these farm jobs that do exist, they're much further away. So people in that roundtable, they were talking about traveling as much as 50 miles to those jobs, and that's a big change in terms of cost to them, in terms of gasoline and having to have a car to get to those distances.

And farmworkers are very explicit in their view of the drought and drought assistance, and you also heard part of that in the previous panel, but I'd like to reiterate it. It was quite explicit, the discussion about leveraging current drought assistance to enable farmworkers in the rural community to be better off after the drought ends. They're not interested in stopgap measures that would just get you through that time period and then you're not any better off after the drought. Because you also have to remember that in California, and particularly in the Central Valley, the

highest level of poverty in the state in these rural communities, and that poverty level was there before the drought, before the recession. It's there and it's, and the farmworkers are asking for means of dealing with that. It's one of the things.

And what I thought was interesting--and this is particularly my role as the broadband coordinator--is that farmworkers expressed the need for broadband access in rural communities. It was the direct reason for that because they recognized that broadband is a means to access worker training, which you also heard about in the previous panel, worker training to get the skills for the new drought-adjusted agriculture. And if you look at it from--and I'll… That's their perspective that they raised.

I'll look at the same thing from my perspective as an economist, an agriculture economist. And the drought is a disruptive event, but there can be a positive side that comes out of it if you think about it--it does--as a disruptive event and essentially knocking out the status quo in a lot of things going on in agriculture. What it does do is opens the door for innovation and stimulates innovation. Basically, it forces people to innovate if they're going to survive. Those who… And it opens the door, and if you think about innovation, those are the… Innovation is a key part of what California agriculture has a whole history of being known for, is why we got to where we are in California agriculture. It's also the tech industry, and we are now seeing the two come together and the opportunity with innovation somewhat stimulated by the drought--but it was happening anyway--moving faster.

So if the drought is driving farmers to adopt the latest new silicon-chip-based technology, it's a fast fundamental shift that's occurring. I think it's comparable to the advent of mechanization in the early 20th century and the steel plow in the mid-19th century. It's coming very fast. Drought is moving it faster than it otherwise might. This technology change is driven by the need to use

available water for farming more efficiently or more effectively. It offers the opportunity for farming not just to survive the drought but actually to thrive in whatever new water ethos there is. The net consequence for farmworkers is this: It's going to change the nature of the skills needed for farming, and I think the farmworkers even in the previous panel but certainly at that roundtable, they seem to recognize that. And what it means is that a new set of skills needs to be obtained to be able to do that kind of more technology-oriented farming.

Farmworker education can be met by using existing program in distance learning through the community colleges, exiting workforce training programs. Particularly, the community colleges in rural areas such as West Hills, Coalinga, or Reedley are at the forefront of this. West Hills--who I have actually worked with quite a bit--they have their Farm of the Future program which is the hands-on training of the newest of whatever farming technology or farming skills that are needed. They're doing that directly there.

This new ag technology is not just water oriented, but it does cover a lot of different areas from water to increased yield--you've heard references to that--strengthening the environmental footprint of agriculture; energy usage, either shrinking energy usage or renewable energy. And then another area in food safety, and there was kind of a half reference to that discussion about pesticides which comes in with that.

What these technologies have in common is the use of silicon chip technology and remote sensing and control devices to generate and transmit data. The resultant data analytics combined with agronomics offers much greater efficiency in the use of water and increases in yield. Agriculture data analytics also offer the ability to run scenarios into the future of alternative types of crops that could be grown given the inputs that are there--what you think the inputs would be--say,

less water in the future--and figure out which of the 400 crops that are produced in California might be better off to be grown.

Again, farmworkers will need to acquire these new technology-based skills in the shift to this technology-oriented agriculture. And I think it's important to remember that this technology does not replace farmers or farmworkers. It is a new tool for better farming with or without drought.

This ag technology has a major constraint, and it's not water. It depends on transmission of data from sensors in the farm field, as would be the shorthand description of it. Wireless broadband access in the farm field has to be available to utilize this technology, and this is the weak point of California's rural infrastructure, rural broadband. Broadband overall is the platform for rural prosperity. For today's discussion, we're just talking about ag technology in the farm field, but there's a whole other range of things. And, in fact, today--as we're here--at UC Davis there is an Apps for Agriculture Hackathon going on, where they're actually developing apps with direct application to agriculture. And it occurred to me--because I was there yesterday when they started the hackathon--and one of the discussions that was raised by one of the farmers there of an app--they were looking for--was an app that would reach farmworkers and give them education or the knowledge of the pesticide rules in their native language. And this would be an application of--you could think of it this way--of social media into creating an app that would give you all the lessons of what you needed to do in the native language. And also, it would be--I guess it would be--audio. So it's not dependent on a written set of instructions--which may or may not work for, depending upon that population.

So this is the kind of innovation that can come from technology if you push it. But, again, it doesn't work unless you've got the rural broadband. It's also a link between both the rural and the

urban parts of California. In the handout, in this chart, there's like a big--I won't go through it--but there's a big sort of chart which shows that linkage between the urban and rural parts of California. I mean, notably, I guess one piece of that would be telehealth, telemedicine linking urban hospitals and health care to the rural patient or farmworker. It's a much more seamless application of things, but the whole range of areas is part of that.

And, you know, one of the things that's important to remember about broadband is--when you think of California, and they talk about broadband and they talk about the 96% of the state that's urban in terms of where the population is--but you have to remember 95% of the state by geography is rural. You don't get a statewide ubiquitous broadband system unless you fill in the 95% of the state. And that's something that, if you talk to telecommunications people, they don't think about because they're very focused on the urban population and where that is. So in that sense, we are, today, literally in a very similar situation to what we were in the 1930s with electricity. In the 1930s, electricity had come to all the big cities. Rural America was not wired up. And you can… And it didn't pencil out for the electric company, so you can understand why that is. And that's where at USDA the Rural Electrification Agency was developed and in the '30s, '40s, '50s and '60s brought electricity to rural areas across America, including California. On the broadband side, it's the same thing. Because if you develop those apps--and that discussion came up yesterday, the connectivity aspect--if you have the app, if you have the light bulb, it doesn't do you any good if you don't have electricity or you don't have the rural broadband. And that's the connection in there.

So I'd like to conclude with these remarks: The ag sector--to repeat--the ag sector is rapidly adopting chip-based ag technology which offers substantial increases in efficiencies and irrigation and other inputs such as ag chemicals. Farmworkers are affected not only by fallow land but shifts

in the type of agriculture and the technological skills needed. The ag sector and farmworkers need access to better broadband to utilize the new and evolving ag technology to acquire the new ag tech skills needed for farming available via distance learning and rural community colleges. The rural broadband infrastructure is the critical underlying platform for adaption to disruption caused by drought and for the future economy of rural areas. So I'll leave you with my vision statement. Development of new agriculture technology and its adoption in California offers continued growth of the agriculture economy and the potential to develop agriculture technology clusters across California--with the caveat--if there is robust broadband infrastructure in rural areas. So thank you.

SENATOR GALGIANI: Thank you. And next we have Tim Johnson, President and CEO for the California Rice Commission. Please.

MR. TIM JOHNSON: Well, thank you very much for the opportunity to address you today. I am Tim Johnson of the California Rice Commission. We represent the state's rice farmers as well as the rice marketers. There are over 40. We're about a billion-dollar-a-year industry, and we grow rice on average about 550,000 acres.

Really, we'll have my comments focus on three areas--very practical as you would expect from a farmer, an agricultural group. First will be the impact of the drought on our industry; I think it's quite remarkable and fairly unique. I will also talk about actions that I do not believe will help from this body moving forward. I'll conclude on some actions that we do believe would make the drought situation better for the coming years.

Well, first, with regard to the impact of the drought on our industry--really, no single crop has been more impacted--maybe forage crops--other than rice. Last year, in 2014, we grew 25% less acres. This year, for 2015, it got even worse, 30% fewer acres planted. So this year, we'll

grow 411,000 acres of rice. That's a reduction of 139,000 acres. You hear this number: 500,000 acres of fallow ground in addition. That--139,000 of that was rice.

It's meant significant impact on farmers and communities and suppliers, and I'm going to focus a little bit more on the supplier side in my comments. Of course, less income, fewer farm jobs. Farm jobs in rice tend to be long-term employees, sometimes multi-generational. Farmers are doing everything they possibly can to keep as many people employed, maybe fewer seasonal workers; but we're also starting to see that erode into your long-term, 20-, 30-year employees with benefits, members of the family. And it's having an impact. Also, less tax revenue and less need for services.

Yesterday, I happened to be standing at Farm Air, which is an ag applicator just right outside Sacramento, and I asked Bill Porter, I said, "Bill, you know, how have you been dealing with the drought, fewer acres of rice, fewer need for planes to plant my rice seed, fewer needs for applications of crop protection materials and fertilizer?" And it struck me that he said, "Well, my solution this year has been to sell one of my planes." So you're selling your means for your economic livelihood because that's the only option that you have left. He said, "If it rains, maybe next year I'll hire that pilot back and I'll lease a plane." He says, "If it rains for two years, maybe I'll buy that plane back." But those are the kinds of real world decisions that farmers are making. You're selling equipment, you're selling ground, and our suppliers are having to do the same thing. So while it's been very flexible--I agree with the comments made by the economist and Dr. Lund earlier--we've had amazing resiliency, but it has come at significant and real cost.

The other thing I'd to talk about which is a little less recognized--certainly been alluded to today by a number of speakers--is there's also a less recognized impact, and that's on wildlife. Fully 60% of the food for the Pacific Flyway in the entire Central Valley--so, right, we're talking

about Bakersfield to Redding--60% of the food for the 7 to 10 million ducks, geese, and shorebirds that are here now and will be here through March comes from rice fields. And so, this last winter not only did we have, you know, less acres planted--we normally flood about 300,000 acres to decompose rice straw, all right. We had to have Herculean efforts by our water managers, farmers, environmental and conservation groups we work with in the state to be able to flood 100,000 acres. Two-thirds then of the habitat that rice fields provide that are so critical are just not available unless it starts raining immediately.

I also think that the other less recognized impacts are on the operational changes and investments for fish that have been made by many farmers. We talk a lot about farmers versus fish; and certainly in the Sacramento Valley, you know, our ability to grow a crop and invest in our infrastructure also benefits salmon. For example, this year in the Sacramento Valley, the Reclamation District 108 funded all the permitting processes that really jumpstarted a project called the Knights Landing Outfall Gates. They paid for the permitting so the federal government could come in and invest in the infrastructure, and that will keep then salmon out of the Colusa Basin drain and allow them to stay in the river and be more successful. Glenn-Colusa Irrigation District put gravel beds in the Sacramento River also, just like reclamation district outside their service area. So those types of investments are less available when your farming economy suffers.

There's been a lot of angst, obviously, about the drought. I think many of us in the agricultural community feel like there's some simmering action by the legislature; and I would like, if I might, politely but clearly focus on a few things we'd like not to see from the legislature. I don't believe and none of my colleagues that I speak to believe that a change in the water rights system would be at all helpful at this juncture. The system works. It's tested. It's foundational. It provides certainty for us. In the Sacramento Valley, it's allowed those of us with senior water rights

to have that certainty to be able to transfer water to others. You take away that certainty, and that system in the Sacramento Valley will be thrown into turmoil. It's also allowed us to plant rice, provide the environmental benefits that we have talked about, but also has allowed us to work with our local cities and our rural communities to really operate that system as a whole. If you change that foundation, all of that will change.

The second thing I think that would not be helpful is more legislation on groundwater. Agencies and farmers are working hard to implement legislation that was passed last year. That's significant. 2022 the Sacramento Valley will have, as required, the programs in place. Folks are working very hard. Very difficult, very broad piece of legislation that was passed, and I just don't think from anybody that I talk to that additional legislation on groundwater would be even able to be accommodated into the operating reality that we face.

What then should we do? We really do need the $2.7 billion in public benefits for storage, that were passed in Proposition 1, in the north, as many have said. And this is… You'll hear it regionally from everybody, but in the Sacramento Valley it's really the Sites reservoir. As Assembly Member Gallagher had pointed to, if Sites reservoir were in place just this last year, right--fourth year of a drought--400,000 acre-feet of water would have been available for the system, right, for environmental uses, for cities, right, for farming. That's 100,000 acres of crops, right, that could have been planted. It also means for our urban neighbors significant benefit to their water systems. Folsom reservoir was called on significantly for environmental flows this year, right. That water would have been available in Sites reservoir. Again, local project, regional project, takes those storm flows, right, puts them into a reservoir that we call an "offstream" reservoir.

The last item I'd just like to close with is added flexibility for our water managers to do what they do best, which is to manage water for multiple benefits. I don't know a single water manager that talks about managing water for the rice industry. They talk about managing water for agriculture in their district, their adjoining communities, Sacramento National Wildlife Refuge--not even one of their, right, their members, their clients. They talk about putting in projects that benefit the Sacramento River. And I think the foundational element for the flexibility this year has not only been the farmers, but the ability to manage that system dynamically; to be able to change when you take deliveries out of the rivers, etc.; to be able to provide environmental benefits, right; and agricultural benefit; as well as to allow some winter flooding as well. Everything that we can do to make those systems more flexible, allow the professional engineers, right, to sit down and figure out how to get the most of this system, those are the kinds of things I think that would benefit us moving forward. Thank you very much.

SENATOR GALGIANI: And our last panelist, Daniel Mountjoy, Ph.D., Director of Resource Stewardship and Sustainable Conservation. Thank you.

DR. DANIEL MOUNTJOY: Thank you very much. We've heard a lot today. Well, first of all, I work with Sustainable Conservation. We're a nonprofit that works together uniting people around tough resource management issues here in the state. We look for economic solutions to those resource issues that we all depend on.

We've heard today a lot about the consequences of the last four years of the drought. And sort of putting it in economic terms, if we think of the groundwater depletion that's occurred as a draining of our bank account, essentially the reserve that we count upon for our agricultural economy, we've drained this bank account; and what I've heard many of you say is how do we redeposit into that account and what are some of the ways that we can refill that capacity. At this

point, I just came from the California Association of Water Agencies conference down in Indian Wells. There was widespread agreement amongst the water managers from all the 500 water agencies in the state that we need to replenish the groundwater bank, that that is the priority for water management in the state right now, and that replenishment is a key strategy for drought preparedness for future years. It really is the buffer. It's that place that we can draw from. With El Niño predictions this year suggesting that we're going to have a lot of runoff, this is the kind of year that we need to have the tools in place to capture those flows and get them back into the groundwater.

What's been missing is an easy, affordable way to get that water back into the ground. And what I'd like to share with you today is an example demonstrated by a farmer in Assemblyman Perea's district, close to some of your districts, in Fresno County at the Terranova Ranch. Where in 2011--the last year we had high flows on the Kings River and most of the rivers in the state--Don Cameron--who sits also on the state Board of Food and Agriculture, is a very strong, sensible advocate for agriculture--he was able to capture off the Kings River from flood flows enough water to flood his vineyards, pistachios, alfalfa, and fallow ground--1,000 acres--with about 6 to 12 inches of water repetitively over the course of from January all the way through to early July, taking flood water in ways that farmers said was absolutely crazy--he's going to lose his crops, this is insanity. But he farms on very sandy soils, and he put the water on, and it would soak in. He would put it on again; it would soak in. And he did that on these 1,000 acres and was able to acquire 3,000 acre-feet of water cumulatively on his ranch in just that one year in an area of severe groundwater overdraft. Researchers at UC Davis and private consultants monitored this, evaluated it, and found that there was great potential--even more, potentially, actually on those soils if he had had more

water access, which there are in some years--and on top of that, his yields were not affected in any way.

What Don basically did--I think as a model for us to think about--is he allowed rivers to flow back out onto their flood plain and percolate back into the groundwater. We've progressively lost the opportunity to recharge our groundwater basins over actions that we've taken for more than 100 years. One of those is we've levied our rivers to protect our farmland, and we've essentially… The only recharge that can occur from those rivers is in that channel bottom. We've eliminated the vast surface area that used to be recharged by waters other than in rice fields and a few other crops where water is taken out in larger amounts.

We've also, as we heard earlier, eliminated the flood irrigation practice through our targeting on efficiency. And so, we've lost that ability to take surface water off the rivers and put it on the ground and replenish the groundwater in that way. So we've really… We've effectively eliminated the ability to deposit back into the, into account.

What we need to do is take a look at things like what Don has done. Some irrigation districts have done similar actions by purchasing land and building dedicated recharge basins. But this is a costly approach and takes farmland out of production, and there's simply not enough of these basins to capture the very peak flows that only occur every 5 to 10 or 15 years. Currently, in the San Joaquin Valley about one-third of the water in peak flows is taken onto the farmland, either onto dedicated basins or onto farms, taking some water to leach salts. That leaves two-thirds of the available water that's currently not being tapped.

What we know recently is that UC Davis has just published an interactive map of soils throughout the state that are conducive to high rates of infiltration without causing damage to crops because of the coarse nature of those soils. The Almond Board has recently commissioned a map of

the underlying geology under those soils to determine not only can you get it through the soil but can you get it then into groundwater without impermeable clay layers and where there's enough capacity to put it. And the California Water Foundation just completed a study, focused study on the Merced, Madera, and Fresno county area, taking a look at, if we used just the existing irrigation canal capacity of the irrigation districts in those three counties to capture flood waters when its available, we could put 300,000 acre-feet of water onto farmland or into those dedicated basins in those locations on peak years. And over time, that would offset our groundwater overdraft by 20%. And that's only taking water through existing canal capacity, only during the winter fallow months of, basically, December through March. Don Cameron showed you could take it over a much longer period. And if canal capacity was expanded, we could take, basically, another third and double the amount that is currently available to be taken onto land for recharge. We're not talking about taking down levies. What we are saying is use these existing canal systems to direct flood water onto farmland with suitable soils, compatible crops, and in a controlled manner.

We at Sustainable Conservation have been interviewing the farmers around Don Cameron, on the adjacent 16,000 acres plus farmers throughout the San Joaquin Valley that we've learned have been doing this in some degree over the years, and we're learning a lot about the ways they're able to put it on their crops without harm to those crops. We also have done some economic analysis of this; and it turns out the cost of putting water onto farmland--the cost to the farmer because the irrigation canals are already there--is in the range of $40 to $100 per acre-foot recharged, significantly lower than any of the other sort of water development concepts that are out there right now, and though, that range varies based on whether they have the infrastructure in place. If they've converted to drip irrigation, they may have to put back in flood systems, and those would cost the higher amounts.

In the last month, we've identified at least 25 farmers throughout the San Joaquin Valley who want to be part of a demonstration effort to show that this is possible and have their fields monitored this winter. Some of those sites will just be measuring how much water is captured through different irrigation methods. On some of those, the Almond Board is paying for crop health studies. And on others, with CDFA support and UC Davis, we're going to be measuring what happens to nitrates in the soils. And can we actually put enough water on focused fields to dilute the nitrate in the soil, the historic legacy nitrates, and have a net benefit to groundwater quality below those locations--with the idea that we take this approach not on every acre of farmland but focus it on some acres where you can have dilution as opposed to just simply worsening the movement of nitrate to the groundwater.

We're going to use the findings from these sites to develop guidance for other farmers and to provide guidance to the groundwater sustainability agencies that are looking for a portfolio of strategies to not reduce their pumping first but to think about how do we enhance to supply first. In addition, these solutions can reduce reliance on surface water flows during drought years because that bank account will be there to draw upon. It diffuses some of the tensions between environmental flows and agricultural needs by enhancing that groundwater supply. And it also can provide flood relief to downstream communities where farmers are taking these peak flows off the rivers. The governor has recognized the importance of capturing these high-percolation events by issuing his executive order to expedite permitting of, temporary permitting of flood flow capture. The water board this week is in the midst of developing those permits and the conditions for those permits. We're very curious to know how those are going to pan out in a way that actually does enhance and make sure that this can be practiced.

And in terms of funding needs, if these demonstrations are successful, I think there's going to be a significant need on the part of irrigation districts and water managers to enhance their conveyance capacity, to capture those peak flows; and that's something that we all would benefit, both flood beneficiaries downstream as well as the farmers and the environment.

On-farm recharge is not going to solve all of our groundwater problems, but it's a significant piece of the solution. And the key thing about it is it's available now, it's very low cost, and it can be done without significant investment to achieve much greater rates of water capture than are currently being done at this point.

SENATOR GALGIANI: Okay, thank you very much. Do we have any questions from our members?

ASSEMBLY MEMBER MATHIS: I'll just say, "Great information." You quite literally… I'm working on a bill now--and I will only say that much--but please give me your information so we can cross reference on things. It's the data points. It's the panel that we had in October, looking at the face of the farmworker and all of that. I mean, there's so many different things and different aspects that come to play with the drought and, you know, just the change of crops and how that affects things all the way down. It's just amazing. But looking at the data points and getting that information and getting those collected and having the information… A lot of the times, the problem that we have is we just don't have the right information or, you know, be smarter than the equipment that you have. These are problems we run into day to day. I know Fresno State is working on a lot of stuff--go Dogs!

UNIDENTIFIED MALE: Not this year [laughter].

ASSEMBLY MEMBER MATHIS: Hey… But it's that shared information across the board, and the fact is that this is not just an agricultural problem, it's not a… We're losing jobs and

economic problem--it goes into the health and welfare of everybody in the entire state. It's huge and it's massive; but we have to gather the data; we have to get the right information but also use it and implement it in the policy process. So I look forward to the year to come and what we do develop and what we do get passed. Thank you.

SENATOR GALGIANI: Thank you. Well, that concludes our third panel. I want to thank you very much for all of your efforts and your help and participation in educating us today. Thank you very much.

And now, we will go ahead and open it up for public comment, and on the list I see we have Gail Delihant from Western Growers Association. Welcome.

MS. GAIL DELIHANT: Hi.

SENATOR GALGIANI: Hi. Thanks for staying around.

MS. DELIHANT: Gail Delihant with Western Growers Association. Appreciate all the panels and all the information this morning, this afternoon. A couple of comments from us for our perspective--Western Growers.

The most important thing in our view is to feed more people with fewer inputs--that means leaving a small footprint. And to that end, we have opened up the Center for Innovation and Technology in Salinas. In fact, we have a grand opening next week on the 10th. So we've actually partnered with the Silicon Valley folks and with Forbes because it's going to take some money, but our growers are committed to working out and trying to figure out how to move forward and continue to grow food in this state. So we're committed to that, and we're willing to put up quite a bit of money to do that.

We are also concerned about some of the things that were said, too, with regard to the drip irrigation and the technologies that we… It was almost permanent-crop centric, and so I'd like to

take you over to Central Coast a little bit. And we usually have about two crops a year over there. I'd say 90% of the growers are on drip, and that drip tape doesn't last very long because go in and till the ground, and so the drip tape gets all messed up and it needs to be replaced. So over the Central Coast, it's just a little bit different than the Central Valley on how we irrigate our crop over there.

Very concerned about groundwater recharge. I live and breathe most of my life at the water boards, and water quality is a huge, huge issue for growers. So when we talk about flood irrigating--I know Dr. Mountjoy mentioned it a little bit--but there's a huge water quality issue when you flood irrigate because we will be regulated. We've been regulated to surface water quality, but we will be regulated to water quality going down to the groundwater. We cannot irrigate any longer knowing that whatever's in the soil is going to reach the groundwater because of our anti-deg policy of the state. And working on that, trying to figure out how do we get past some of these regulatory barriers that we are facing and implement all these great ideas that the panelists have brought forward today--those things are concern me.

The other thing that concerns me is that when we talked about how much more we produced this past year--it did cost a lot. Growers who… I've got a grower that only farms about 125 acres, and so his water bill is usually around $5,000 for that 25 acres. It's a row crop. He had to pay $155,000 for his water this last year. So he did that so he wouldn't lose his crop, so he could fulfill his contract, and so he could have this contract for next year, providing it rains because he's only on surface water and could not get groundwater. And so those costs are true. Now, he's got to go to the bank. Will the bank loan him some money? We don't know, and that's a big concern.

The other thing is the costs of doing business, with the drip and all the technologies; and even though a lot of Western Growers' members and a lot of farmers who--just farmers in general--

either get grants or have funded the bill themselves on all these technologies that are available, they all cost a lot of money. And then we come to the state--I also live in the Budget Committee--where there's a lot of fees. There's a lot of fees on agriculture, last year, that we have to pay just to the state agencies that--for our permits and for our--the benefit of growing food.

The other thing that I'd like to mention is the water measurement legislation was passed last year in the drought package of the budget, so growers have to report water measurement. Maybe not… And the state water board is actually drafting those regulations right now, how that looks. So going forward, there will be a lot of measurement. You can't manage what you don't measure. We get that. And so, I just wanted to, you know, let you know that the state water board is doing the regulations on that. So that's all I had to say.

SENATOR GALGIANI: Okay, thank you very much. Next, we have Alicia Rockwell with Blue Diamond Growers, if she's still here.

Okay, next, we have Joey Airoso with Airoso Dairy and Land O' Lakes. Thank you.

MR. JOEY AIROSO: Good afternoon.

SENATOR GALGIANI: Good afternoon.

MR. AIROSO: Thank you for providing me with an opportunity to speak to you today about…

SENATOR GALGIANI: You're welcome.

MR. AIROSO: …the ongoing drought in our state.

Just a little bit of history. Our family has been dairy farming here in California since 1912. Came over here from the Azores Islands, my great grandfather; and I'm fourth generation. I have a son and a grandson, and my dad's still on the farm, so four generations working on the farm. Today, our family, we currently own… We milk cows in Tulare County, which is one of the most

impacted areas in the state when you look at drought, and we employ 38 people. The dairy industry is the number one industry in Tulare County, which is the number one county in the United States for food production or agriculture production. The dairy industry in our state is a $21 billion industry, and it is the largest dairy state in the United States. And I think, really, from a technological standpoint, in efficiency, it's known around the world as probably--California is known as one of the most efficient dairy operating areas in the world. And so I think, you know, our industry has always been ahead of--you know, trying to stay ahead of the curve.

We ship our milk to Land O' Lakes. They have a couple of plants here in California, Orland and Tulare. They process about 75% of the butter that they market here in Tulare, California and throughout the United States and the world. So you know, they're definitely an organization that, you know, I'm proud to be a part of. They're an organization that not only feeds people in this country, but they've taken, played a role internationally and participated in selling food and products overseas to help support feeding people around the world.

There's… I think sometimes people underestimate what California means to not just the United States but to the world when it comes to food production. I've had the opportunity to travel around the world just a little bit, and in places like South Korea, Italy, Europe where when you mention California, it's--we have our own name in the world when it comes to food. People have a deep appreciation for the quality of food we grow here but also the diversity of food. And, you know, when I was in South Korea, I had third graders come up to me and thank me for all the good things that they get to eat that come from California. And I mean, it almost brought tears to my eyes, you know, because it, you know… I know as an agriculturist I've been born to, you know… I know we play an important role in providing food, affordable food for not just people in our country but for people around the world. And, you know, it made me feel good. And I think that's

something that I think sometimes when you read the papers and you see how people are questioning whether we should be using our water to grow products here so that we can export them, you know, it's… We have a duty to not, to feed not just ourselves but to help keep peace on this planet, and I think food is an excellent way of doing that.

Tulare County, it's… Tulare County is like, for the drought, is like the guy that goes to war, and he's on the front line with a gun. That's how we are to the drought. And to give you an example of… I'm president of the Tulare County Farm Bureau, and we've had--in our area there's four and in some places five years where there hasn't been any surface water ran. And so, the surface water really has been the key to keeping our groundwater charged and providing our community--everybody in our community is connected with agricultural jobs. All the communities that are associated, especially in Tulare County, those people, their livelihoods depend upon ag. And so we've had… We've went from two years ago where we had people that said, well, you know, it hasn't affected me yet and so I don't think it's that bad in our own county, to today where I think everybody really is in panic mode. I heard today that we aren't in panic mode. I beg to differ, respectfully, but I think, you know, when you start talking to people around our state… We had a gentleman in the northern part of the state--they're dry. A friend of mine's in Ferndale, which is about as far north as you can get along the coast. His water table has dropped 50 feet in the last five years. We're all being impacted.

And so, I guess a disappointing thing for me is that we still all aren't working together enough. There's too many people trying to take care of their own best interest, and I think agriculture really needs to come together. And I always look at California kind of like my farm. And I really think--I don't consider myself the smartest person in the world--but I think water is an important enough issue where we have to figure out how we get the leadership in this state to

develop an appetite for the people that live in the large cities to help us, so we can all work together and have the ability to keep growing our food. I mean, we play a vital role in the valley, all along the middle of the state, in food production; and I think we just haven't worked together in ag to get that message out. And I think we've… When we've had years where we've had enough water, we've always been able to do our thing just a little bit and it's worked out. But I think now that we're in a, at a point now where I think working together is just going to be the key to this. And, you know, it's going to require--it's going to require all--everything that's been talked about today, really. I mean, there's… Everybody's had a good idea here today, but it really is going to require a combination of everything because the key is opportunity. The key is grabbing water when there's opportunity. At some point, in this state on any given day looking forward, there is going to be a day where somebody is going to pick the phone call up and say, hey, I would love to get rid of some water today. And that's the day that somebody… We need to have the infrastructure in place to be able to move water around this place just like everybody's figured out on our farms that we're able to move water around our farms and take care of our crops.

You know, there's a lot, you know, they… People have testified today to the amount of ground that's been set aside, and it's about exactly what's going on on our farm. We've left 15% to 20% the last couple of years. And, you know, I had a reporter from the *LA Times* down in the spring; and she said, "We think there needs to be a million acres of land set aside in the Central Valley." And I said, "That's fine, but I want to know where we're going to get our food from." I want to know where we are going to get our food from because this valley produces a lot of food for our country that I think people take for granted.

So there's been a lot of ideas talked about today, and all these ideas--like I said earlier--are excellent. The one that resonates the most for me… Two and a half years ago when this thing really

looked serious, our--the Tule Basin, Tule irrigation district--we started a working group where we started working on how we were going to try to manage our water situation locally and--because we're in an area where we're short. And one of the ways is--so what we did… The first meeting we had, we had growers looking at each other and, like, you know--people tend to want to pick on each other. Well, it's your fault--it's your commodities' fault--or it's your commodities' fault. Collectively, we decided we're going to do our own trial here, so we metered up six of the major commodities that grown in our basin; and we're two years into that project.

My farm is one of the projects. It's completely metered, and what we've found is pretty much what was said here today: if you want to be economically viable and grow a very good crop, it just takes quite a bit of water. It doesn't matter whether you're flood irrigating, whether you're using drip, it requires water. And so one of the things that we've been grappling with is--and I think it's going to be imperative going forward--is SGMA will not work without proper infrastructure in this state to give basins like ours and other basins that are short the ability to have that, take advantage of opportunity when God does provide us with plenty of water to be able to get water back into our areas and recharge. And…

SENATOR GALGIANI: Okay.

MR. AIROSO: …one of the ideas that we've talked about--and I'm glad that it's been talked about a lot here today--was individual farmers putting in basins, soil testing and finding spots that are good for water, sinking water, using the existing structures that we have, the canal systems, to be able to bring water in when we have the opportunity and sink water into those basins. I think it's…

SENATOR GALGIANI: Okay.

MR. AIROSO: …a great idea that…

SENATOR GALGIANI: Thank you.

MR. AIROSO: …only works, though, with increased storage. It was brought up today. Two years ago, I was up at Pine Flat Dam. Three engineers gave us the tour. I asked the question, "Will storage help you?" The engineer said storage would help us immensely up here because most of these dams are here for flood control. We have no way to really take advantage of opportunity because we don't have enough, especially in the early part of the year.

SENATOR GALGIANI: Okay. I apologize.

MR. AIROSO: Okay.

SENATOR GALGIANI: I'm going to have to ask you to kind of bring it to a close.

MR. AIROSO: Okay, I will.

SENATOR GALGIANI: We have several other speakers on the list, and we were committed to a three-hour hearing.

MR. AIROSO: Okay. Again, I just, you know… I'll just close by saying that I think one of the important things that people need to recognize is that our land in everybody's communities here supports a lot of other things just besides our crops. You know, everybody paid their taxes this month; and all of our tax bills have hospital bonds on them, they have school bonds, education bonds; and we want to support those kinds of things; but we have to have a good water infrastructure in this state so that we have the ability to be economically viable and support that.

And the last thing I would say is that I think agriculture in general really needs to work together more from one end of the state to the other. That's going to be the key to this thing. Thank you.

SENATOR GALGIANI: Thank you very much.

ASSEMBLY MEMBER MATHIS: Thanks for coming up, Joe.

SENATOR GALGIANI: Noe Paramo. Is he still here?

UNIDENTIFIED FEMALE: I think he left.

UNIDENTIFIED MALE: No.

UNIDENTIFIED FEMALE: No, he left.

SENATOR GALGIANI: Okay.

UNIDENTIFIED FEMALE: I don't see him.

SENATOR GALGIANI: Juanita Ontiveros. Is she still here?

UNIDENTIFIED FEMALE: Huh-uh. [inaudible].

SENATOR GALGIANI: Katerina Robinson. Is she here?

UNIDENTIFIED FEMALE: I don't see her.

SENATOR GALGIANI: Okay.

UNIDENTIFIED FEMALE: They're gone.

SENATOR GALGIANI: Okay.

UNIDENTIFIED FEMALE: [inaudible].

SENATOR GALGIANI: I guess that brings us to a close. Thank you very much to all of the panelists, all the participants, those who participated in public comment; and this meeting is adjourned. Thank you.

--o0o--